

# ***Grizzly*** ***Industrial, Inc.***®

## **MODEL G0746/G0749** **GEAR-HEAD LATHE** **OWNER'S MANUAL**

*(For models manufactured since 3/13)*



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**WARNING: NO PORTION OF THIS MANUAL MAY BE REPRODUCED IN ANY SHAPE  
OR FORM WITHOUT THE WRITTEN APPROVAL OF GRIZZLY INDUSTRIAL, INC.**  
#BLTS15786 PRINTED IN CHINA



## **WARNING!**

**This manual provides critical safety instructions on the proper setup, operation, maintenance, and service of this machine/tool. Save this document, refer to it often, and use it to instruct other operators.**

**Failure to read, understand and follow the instructions in this manual may result in fire or serious personal injury—including amputation, electrocution, or death.**

**The owner of this machine/tool is solely responsible for its safe use. This responsibility includes but is not limited to proper installation in a safe environment, personnel training and usage authorization, proper inspection and maintenance, manual availability and comprehension, application of safety devices, cutting/sanding/grinding tool integrity, and the usage of personal protective equipment.**

**The manufacturer will not be held liable for injury or property damage from negligence, improper training, machine modifications or misuse.**



## **WARNING!**

**Some dust created by power sanding, sawing, grinding, drilling, and other construction activities contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are:**

- **Lead from lead-based paints.**
- **Crystalline silica from bricks, cement and other masonry products.**
- **Arsenic and chromium from chemically-treated lumber.**

**Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: Work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.**

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# INTRODUCTION

## Machine Description

The Model G0746 is a 20" x 60" lathe. The Model G0749 is a 16" x 40" lathe. The main difference between the two models is the G0746 has a larger spindle bore, swing over bed, and distance between centers than the G0749.

The Models G0746 and G0749 feature thick castings and super heavy-duty construction, making them extremely rigid and solid. We equipped both models with a 10 HP, 220V, 3-phase spindle motor, massive tailstock, steady rest, and follow rest—ensuring these lathes are a reliable workhorse in demanding machine shops that turn big and heavy workpieces.

## Contact Info

We stand behind our machines. If you have any questions or need help, use the information below to contact us. Before contacting, please get the serial number and manufacture date of your machine. This will help us help you faster.

Grizzly Technical Support  
1203 Lycoming Mall Circle  
Muncy, PA 17756  
Phone: (570) 546-9663  
Email: techsupport@grizzly.com

We want your feedback on this manual. What did you like about it? Where could it be improved? Please take a few minutes to give us feedback.

Grizzly Documentation Manager  
P.O. Box 2069  
Bellingham, WA 98227-2069  
Email: manuals@grizzly.com


## Manual Accuracy

We are proud to provide a high-quality owner's manual with your new machine!

We made every effort to be exact with the instructions, specifications, drawings, and photographs contained inside. Sometimes we make mistakes, but our policy of continuous improvement also means that **sometimes the machine you receive will be slightly different than what is shown in the manual.**

If you find this to be the case, and the difference between the manual and machine leaves you confused about a procedure, check our website for an updated version. We post current manuals and manual updates for free on our website at [www.grizzly.com](http://www.grizzly.com).

Alternatively, you can call our Technical Support for help. Before calling, please write down the **Manufacture Date** and **Serial Number** stamped into the machine ID label (see below). This information helps us determine if updated documentation is available for your machine.

		<b>MODEL GXXXX</b> <b>MACHINE NAME</b>	
<b>SPECIFICATIONS</b>		<b>WARNING!</b>	
Motor:		To reduce risk of serious injury when using this machine:	
Specification:		1. Read manual before operation.	
Specification:		2. Wear safety glasses and respirator.	
Specification:		3. Make sure machine is properly adjusted/setup and	
Weight:		4. Make sure the motor has stopped and disconnect power before adjustments, maintenance, or service.	
		5. DO NOT expose to rain or dampness.	
		6. DO NOT modify this machine in any way.	
		7.	
		8.	
		9. Do not use while under the influence of drugs or alcohol.	
		10. Maintain machine carefully to prevent accidents.	

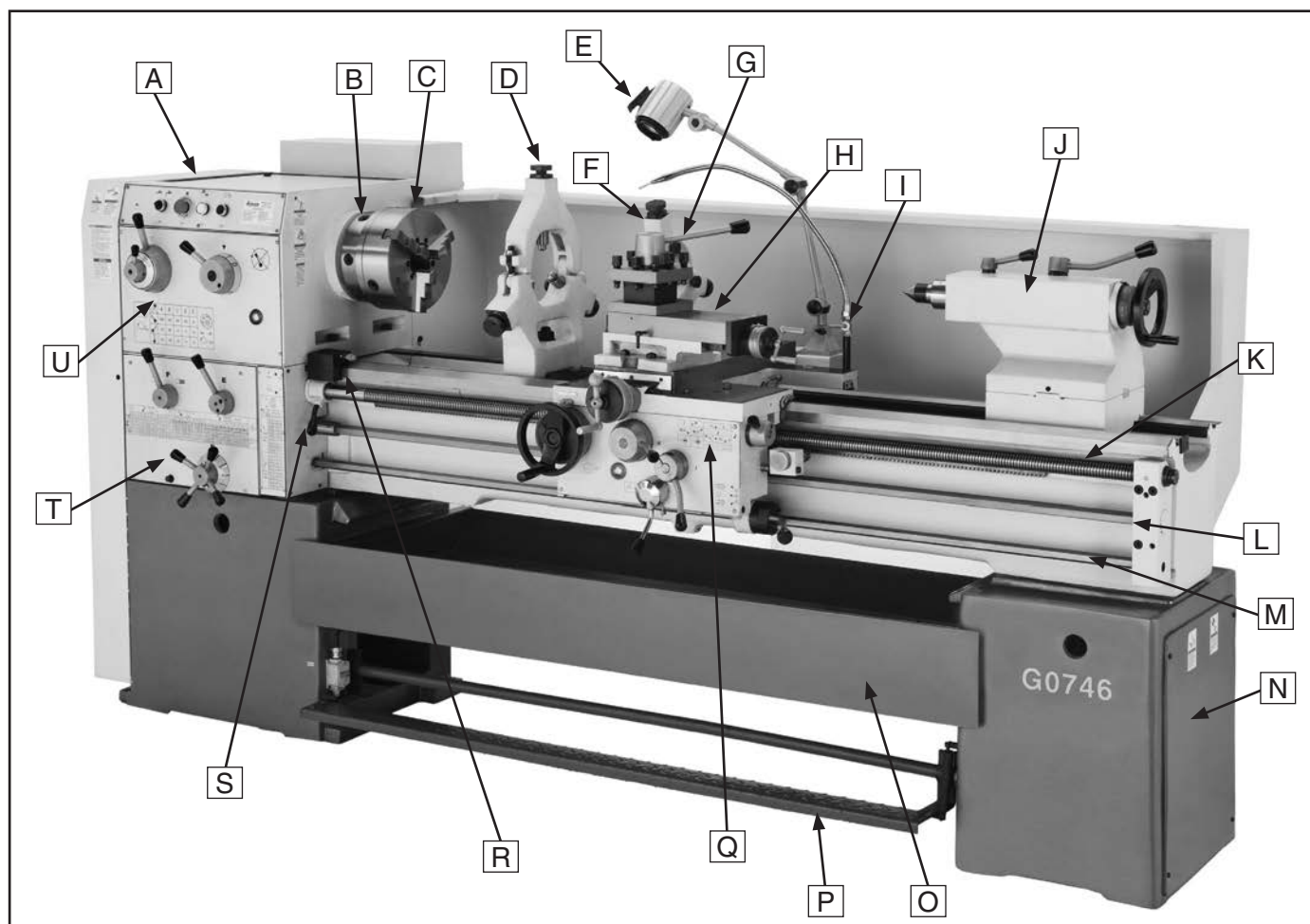
Manufactured for Grizzly in Taiwan

**Manufacture Date** [ ]

**Serial Number** [ ]



# Identification



**Figure 1.** Model G0746 identification.

- |   |   |
|---|---|
| <b>A.</b> Headstock                                 | <b>L.</b> Feed Rod  |
| <b>B.</b> D1-8 Camlock MT#7 Spindle                 | <b>M.</b> Control Rod   |
| <b>C.</b> 3-Jaw Chuck 10"                           | <b>N.</b> Coolant Reservoir & Pump Access                               |
| <b>D.</b> Steady Rest                               | <b>O.</b> Chip Drawer   |
| <b>E.</b> Halogen Work Lamp                         | <b>P.</b> Safety Foot Brake   |
| <b>F.</b> Follow Rest                               | <b>Q.</b> Carriage (see <b>Page 6</b> for details)                      |
| <b>G.</b> 4-Way Tool Post                           | <b>R.</b> Micrometer Stop   |
| <b>H.</b> Compound Rest                             | <b>S.</b> Leadscrew Feed Rod Selection Lever                            |
| <b>I.</b> Coolant Nozzle & Valve                    | <b>T.</b> Quick-Change Gearbox Controls (see <b>Page 5</b> for details) |
| <b>J.</b> Tailstock (see <b>Page 6</b> for details) | <b>U.</b> Headstock Controls (see <b>Page 5</b> for details)            |
| <b>K.</b> Longitudinal Leadscrew                    |   |

## **!WARNING**

Serious personal injury could occur if you connect the machine to power before completing the setup process. **DO NOT** connect power until instructed to do so later in this manual.

## **!WARNING**

Untrained users have an increased risk of seriously injuring themselves with this machine. Do not operate this machine until you have understood this entire manual and received proper training.



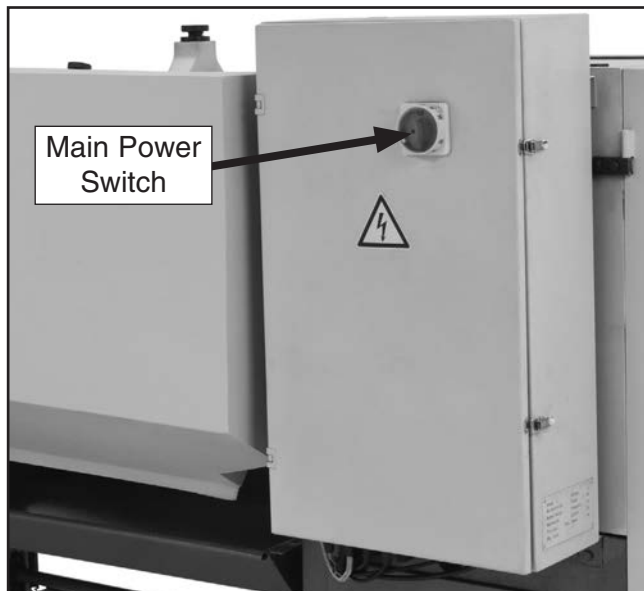
# Controls & Components

Refer to **Figures 3–8** and the following descriptions to become familiar with the basic controls of this lathe.

Many of the controls will be explained in greater detail later in this manual.

## Master Power Switch

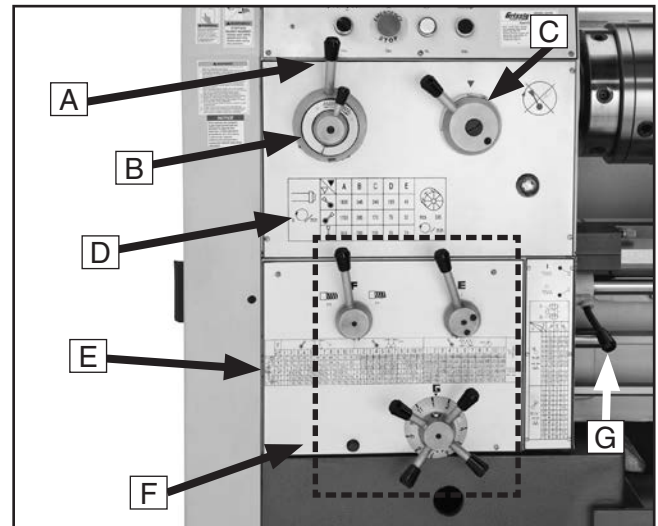
The rotary switch shown in Figure 2 toggles incoming power ON and OFF to the lathe controls. As a safety feature, it also prevents the electrical cabinet door from being opened when the switch is ON.



**Figure 2.** Location of the main power switch.



## Headstock



**Figure 3.** Headstock controls.

- A. Spindle Speed Range Lever:** Selects one of three spindle speed ranges.
- B. Headstock Feed Direction Lever:** Controls rotation direction of leadscrew and feed rod.
- C. Spindle Speed Lever:** Selects one of five different spindle speeds within the selected speed range.
- D. Spindle Speed Chart:** Shows how to position the spindle speed lever and spindle range lever to set each of the 15 available spindle speeds.
- E. Thread and Feed Chart:** Shows how to arrange gearbox controls for different threading or feeding options.
- F. Quick-Change Gearbox Levers and Dial:** Controls leadscrew and feed rod speed for threading and feeding operations.
- G. Leadscrew Feed Rod Selection Lever:** Enables leadscrew or feed rod.



## Carriage

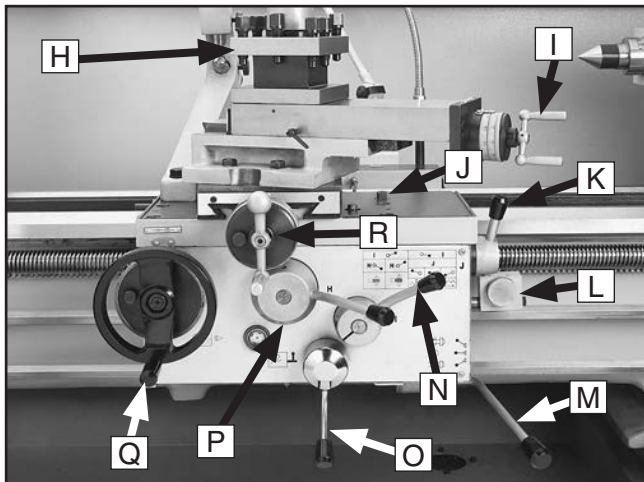


Figure 4. Carriage controls.

- H. 4-Way Tool Post:** Holds up to four different types of tooling, making it quick and easy to switch tool type for different types of turning operations.
- I. Compound Rest Handwheel:** Moves tool toward and away from workpiece at preset angle.
- J. Carriage Lock:** Secures carriage in place for greater rigidity when it should not move.
- K. Feed Selection Lever:** Selects power feed for carriage or cross slide.
- L. Thread Dial:** Indicates when to engage the half nut during inch threading operations.
- M. Spindle Lever:** Starts, stops, and reverses direction of spindle rotation.
- N. Feed Lever:** Enables carriage for power feed or threading operations.
- O. One-Shot Oiler:** Pumps oil from apron reservoir to lubricate carriage ways.
- P. Half Nut Lever:** Engages/disengages half nut for threading operations.
- Q. Carriage Handwheel:** Moves carriage along the bed.
- R. Cross Slide Handwheel:** Moves cross slide toward and away from workpiece.

## Tailstock

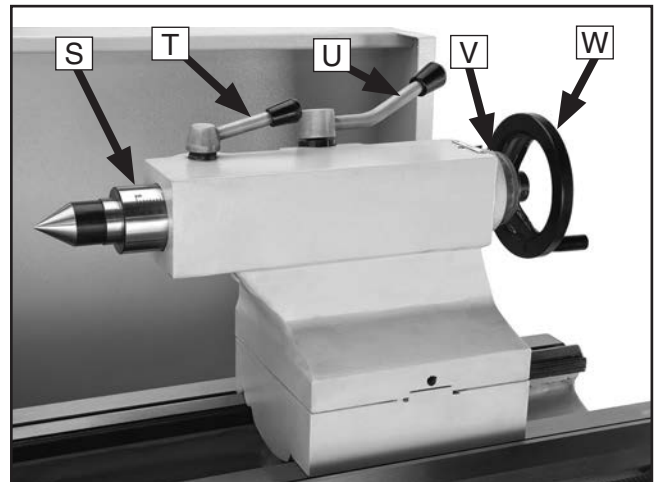


Figure 5. Additional tailstock controls.

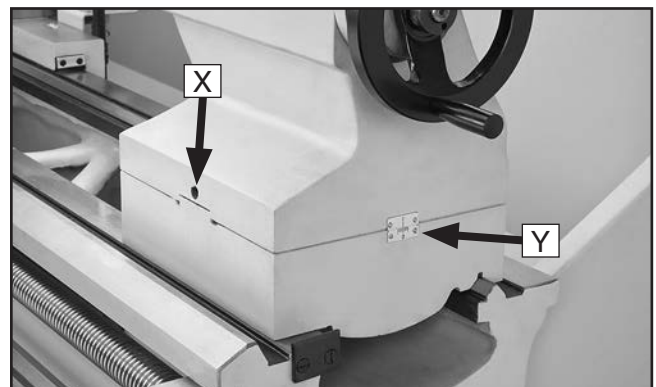


Figure 6. Tailstock controls.

- S. Quill:** Holds centers and tooling.
- T. Quill Lock Lever:** Secures quill in position.
- U. Tailstock Lock Lever:** Secures tailstock in position along the bedway.
- V. Graduated Scale:** Indicates quill movement in increments of 0.001" with one full revolution equaling 0.200" of quill travel.
- W. Quill Handwheel:** Moves quill toward or away from spindle.
- X. Tailstock Offset Screws:** Adjusts tailstock offset left or right from spindle centerline (1 of 2).
- Y. Offset Scale:** Indicates relative distance of tailstock offset from spindle centerline.





## Control Panel

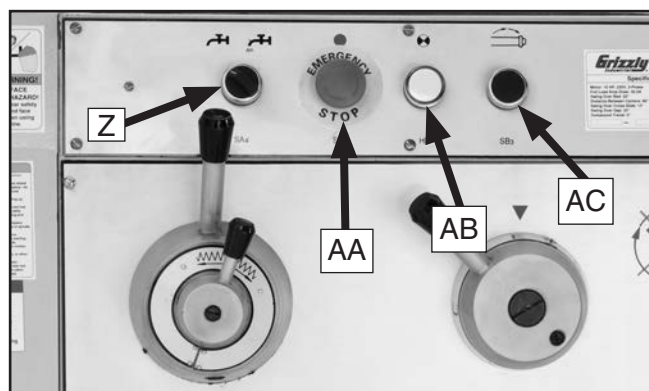


Figure 7. Control panel.

**Z. Coolant Pump Switch:** Controls coolant pump motor.

**AA. EMERGENCY STOP Button:** Stops all machine functions. Twist clockwise to reset.

**AB. Power Lamp:** Illuminates when main power switch is turned ON and EMERGENCY STOP button is reset.

**AC. Jog/Inching Button:** Powers forward spindle rotation as long as it is pressed.

## End Gears

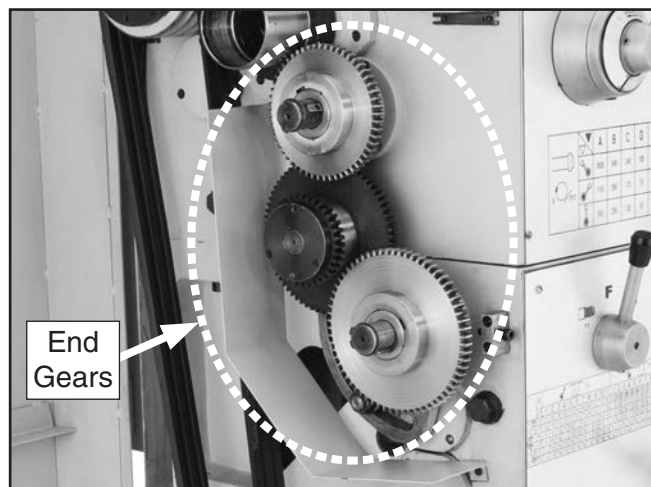


Figure 8. End gear components.

Configuring the end gears (shown in **Figure 8**) controls the speed of the leadscrew for threading or the feed rod for power feed operations.

## Safety Foot Brake

This lathe is equipped with a foot brake (see **Figure 9**) to quickly stop the spindle instead of allowing the spindle to coast to a stop on its own. Pushing the foot brake while the spindle is ON cuts power to the motor and stops the spindle. After the foot brake is used, the spindle lever must be returned to the OFF (middle) position to reset the spindle switches before re-starting spindle rotation.

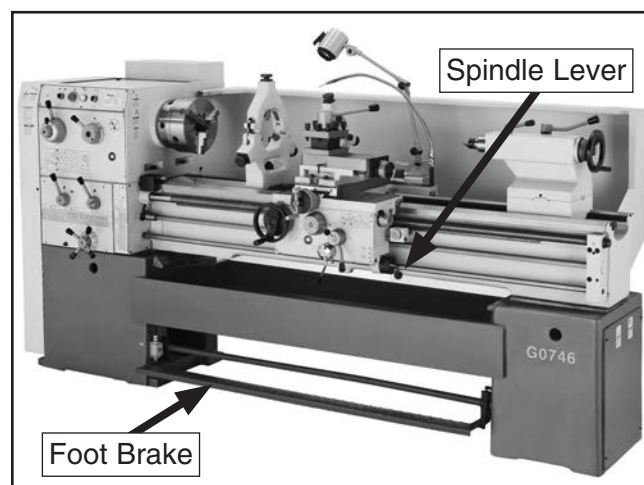


Figure 9. Foot brake and spindle lever.





# MACHINE DATA SHEET

Customer Service #: (570) 546-9663 · To Order Call: (800) 523-4777 · Fax #: (800) 438-5901

## MODEL G0746 20" X 60" LATHE

### Product Dimensions:

Weight..... 4145 lbs.  
Width (side-to-side) x Depth (front-to-back) x Height..... 108-1/4 x 42-1/2 x 59 in.  
Footprint (Length x Width)..... 102-3/4 x 20-7/8 in.

### Shipping Dimensions:

Type..... Wood Crate  
Content..... Machine  
Weight..... 5445 lbs.  
Length x Width x Height..... 115 x 45 x 69 in.  
Must Ship Upright..... Yes

### Electrical:

Power Requirement..... 220V, 3-Phase, 60 Hz  
Prewired Voltage..... 220V  
Full-Load Current Rating..... 30.35A  
Minimum Circuit Size..... 40A  
Connection Type..... Permanent (Hardwire)  
Switch Type..... Control Panel w/Magnetic Switch Protection  
Recommended Phase Converter..... H3741

### Motors:

#### Main

Type..... TEFC Induction  
Horsepower..... 10 HP  
Phase..... 3-Phase  
Amps..... 30A  
Speed..... 1725 RPM  
Power Transfer ..... Triple V-Belt Drive  
Bearings..... Shielded & Permanently Lubricated

#### Coolant Pump

Type..... TEFC Induction  
Horsepower..... 1/8 HP  
Phase..... 3-Phase  
Amps..... 0.35A  
Speed..... 3450 RPM  
Power Transfer ..... Direct Drive  
Bearings..... Shielded & Permanently Lubricated





## Main Specifications:

### Operation Info

Swing Over Bed.....	20 in.
Distance Between Centers.....	60 in.
Max Weight Between Centers.....	1300 lbs.
Swing Over Cross Slide.....	13 in.
Swing Over Saddle.....	13 in.
Swing Over Gap.....	25 in.
Maximum Tool Bit Size.....	1 in.
Compound Travel.....	5 in.
Carriage Travel.....	60 in.
Cross Slide Travel.....	13 in.

### Headstock Info

Spindle Bore.....	3.15 in.
Spindle Taper.....	MT#7
Number of Spindle Speeds.....	15
Spindle Speeds.....	24 – 1600 RPM
Spindle Type.....	D1-8 Camlock
Spindle Bearings.....	Tapered Roller
Spindle Length.....	28-1/8 in.
Spindle Length with 3-Jaw Chuck.....	33 in.
Spindle Length with 4-Jaw Chuck.....	32-7/8 in.
Spindle Length with Faceplate.....	29-7/8 in.

### Tailstock Info

Tailstock Quill Travel.....	4-3/4 in.
Tailstock Taper.....	MT#5
Tailstock Barrel Diameter.....	2.6 in.

### Threading Info

Number of Longitudinal Feeds.....	66
Range of Longitudinal Feeds.....	0.0027 – 0.1500 in./rev.
Number of Cross Feeds.....	66
Range of Cross Feeds.....	0.0013 – 0.0750 in./rev
Number of Inch Threads.....	66
Range of Inch Threads.....	1 – 56 TPI
Number of Metric Threads.....	66
Range of Metric Threads.....	0.5 – 28 mm
Number of Modular Pitches.....	33
Range of Modular Pitches.....	0.5 – 3.5 MP
Number of Diametral Pitches.....	33
Range of Diametral Pitches.....	8 – 56 DP

### Dimensions

Bed Width.....	13 in.
Leadscrew Diameter.....	1-3/8 in.
Leadscrew TPI.....	4 TPI
Leadscrew Length.....	79-1/2 in.
Steady Rest Capacity.....	6-1/4 in.
Follow Rest Capacity.....	3-15/16 in.
Faceplate Size.....	17 in.
Feed Rod Diameter.....	13/16 in.
Floor to Center Height.....	45-1/4 in.
Height With Leveling Jacks.....	63 in.



### Construction

Base.....	Cast Iron
Headstock.....	Cast Iron
Headstock Gears.....	Steel
Bed.....	Hardened and Precision-Ground Cast Iron
Body.....	Cast Iron
Stand.....	Cast Iron
Paint.....	Epoxy

### Fluid Capacities

Headstock Capacity.....	18 qt.
Headstock Fluid Type.....	ISO 32 (eg. Grizzly T23963, Mobil DTE Light)
Gearbox Capacity.....	9.5 qt.
Gearbox Fluid Type.....	ISO 68 (eg. Grizzly T23962, Mobil Vactra 2)
Apron Capacity.....	6.5 qt.
Apron Fluid Type.....	ISO 68 (eg. Grizzly T23962, Mobil Vactra 2)
Coolant Capacity.....	21.25 qt.

### Other Specifications:

Country Of Origin .....	China
Warranty .....	1 Year
Approximate Assembly & Setup Time .....	2 Hours
Serial Number Location .....	ID Label on Front of Lathe
Sound Rating .....	85 dB
ISO 9001 Factory .....	Yes
CSA Certified .....	No

### Features:

- Full-length splash guard
- Apron-mounted ON/OFF/reverse spindle lever
- Chip tray slides out for easy cleaning
- Cast iron stand
- Foot brake
- Coolant system
- Halogen light
- Headstock gears run in an oil bath
- Jog button and emergency stop button
- Quick-change tool post
- Micrometer stop
- Universal gearbox allows cutting of inch, metric threads, and modular and diametral pitches

### Accessories Included:

- Steady rest
- Follow rest
- 2 MT#5 dead centers
- Center sleeve
- 10" 3-Jaw chuck with 2 sets of jaws
- 12" 4-Jaw chuck with reversible jaws
- Two change gears
- 8 leveling pads
- Tool box
- Service tools
- Manual





# MACHINE DATA SHEET

Customer Service #: (570) 546-9663 · To Order Call: (800) 523-4777 · Fax #: (800) 438-5901

## MODEL G0749 16 X 40 HEAVY DUTY LATHE

### Product Dimensions:

Weight..... 3616 lbs.  
Width (side-to-side) x Depth (front-to-back) x Height..... 88-5/8 x 42-1/2 x 55-1/8 in.  
Footprint (Length x Width)..... 84 x 21 in.

### Shipping Dimensions:

Type..... Wood Crate  
Content..... Machine  
Weight..... 5049 lbs.  
Length x Width x Height..... 96 x 45 x 69 in.  
Must Ship Upright..... Yes

### Electrical:

Power Requirement..... 220V, 3-Phase, 60 Hz  
Prewired Voltage..... 220V  
Full-Load Current Rating..... 30.3A  
Minimum Circuit Size..... 40A  
Connection Type..... Permanent (Hardwire)  
Switch Type..... Control Panel w/Magnetic Switch Protection  
Recommended Phase Converter..... H3741

### Motors:

#### Main

Type..... TEFC Induction  
Horsepower..... 10 HP  
Phase..... 3-Phase  
Amps..... 30A  
Speed..... 1725 RPM  
Power Transfer ..... V-Belt Drive  
Bearings..... Shielded & Permanently Lubricated

#### Coolant Pump

Type..... TEFC Induction  
Horsepower..... 1/8 HP  
Phase..... 3-Phase  
Amps..... 0.3A  
Speed..... 1725 RPM  
Power Transfer ..... Direct Drive  
Bearings..... Shielded & Permanently Lubricated



## Main Specifications:

### Operation Info

Swing Over Bed.....	16 in.
Distance Between Centers.....	40 in.
Max Weight Between Centers.....	1300 lbs.
Swing Over Cross Slide.....	9 in.
Swing Over Saddle.....	13-3/4 in.
Swing Over Gap.....	21 in.
Maximum Tool Bit Size.....	1 in.
Compound Travel.....	5 in.
Carriage Travel.....	40 in.
Cross Slide Travel.....	13 in.

### Headstock Info

Spindle Bore.....	3.15 in.
Spindle Taper.....	MT#7
Number of Spindle Speeds.....	15
Spindle Speeds.....	24 – 1600 RPM
Spindle Type.....	D1-8 Camlock
Spindle Bearings.....	Tapered Roller
Spindle Length.....	28-1/8 in.
Spindle Length with 3-Jaw Chuck.....	33 in.
Spindle Length with 4-Jaw Chuck.....	32-7/8 in.
Spindle Length with Faceplate.....	29-7/8 in.

### Tailstock Info

Tailstock Quill Travel.....	4-3/4 in.
Tailstock Taper.....	MT#5
Tailstock Barrel Diameter.....	2.6 in.

### Threading Info

Number of Longitudinal Feeds.....	66
Range of Longitudinal Feeds.....	0.0027 – 0.1500 in./rev.
Number of Cross Feeds.....	66
Range of Cross Feeds.....	0.0013 – 0.0750 in./rev
Number of Inch Threads.....	66
Range of Inch Threads.....	1 – 56 TPI
Number of Metric Threads.....	66
Range of Metric Threads.....	0.5 – 28 mm
Number of Modular Pitches.....	33
Range of Modular Pitches.....	0.5 – 3.5 MP
Number of Diametral Pitches.....	33
Range of Diametral Pitches.....	8 – 56 DP

### Dimensions

Bed Width.....	13 in.
Leadscrew Diameter.....	1-3/8 in.
Leadscrew TPI.....	4 TPI
Leadscrew Length.....	59-7/8 in.
Steady Rest Capacity.....	6-1/4 in.
Follow Rest Capacity.....	3-7/8 in.
Faceplate Size.....	15 in.
Feed Rod Diameter.....	7/8 in.
Floor to Center Height.....	41-5/16 in.



**Construction**

Base.....	Cast Iron
Headstock.....	Cast Iron
Headstock Gears.....	Steel
Bed.....	Hardened and Precision-Ground Cast Iron
Body.....	Cast Iron
Stand.....	Cast Iron
Paint.....	Epoxy

**Fluid Capacities**

Headstock Capacity.....	12.75 qt.
Headstock Fluid Type.....	ISO 32 (eg. Grizzly T23963, Mobil DTE Light)
Gearbox Capacity.....	9.5 qt.
Gearbox Fluid Type.....	ISO 68 (eg. Grizzly T23962, Mobil Vactra 2)
Apron Capacity.....	6.5 qt.
Apron Fluid Type.....	ISO 68 (eg. Grizzly T23962, Mobil Vactra 2)
Coolant Capacity.....	21.25 qt.

**Other Specifications:**

Country Of Origin .....	China
Warranty .....	1 Year
Approximate Assembly & Setup Time .....	2 Hours
Serial Number Location .....	ID Label on Headstock
ISO 9001 Factory .....	Yes
CSA Certified .....	No

**Features:**

Full length splash guard  
Apron-mounted ON/OFF/reverse spindle lever  
Chip tray slides out for easy cleaning  
Cast iron stand  
Foot brake  
Coolant system  
Halogen light  
Headstock gears run in an oil bath  
Jog button and emergency stop  
Quick-change tool post  
Micrometer stop  
Universal gearbox allows cutting of inch, metric threads, and modular and diametral pitches

**Accessories Included:**

Steady rest  
Follow rest  
15" faceplate  
MT#5 dead center  
MT#7 to MT#5 sleeve  
10" 3-Jaw chuck with 2 sets of jaws  
12-1/2" 4-Jaw chuck with reversible jaws  
Two change gears  
8 leveling pads  
4-Way tool post  
Tool box  
Service tools  
Oil gun  
Manual



# SECTION 1: SAFETY

## For Your Own Safety, Read Instruction Manual Before Operating This Machine

The purpose of safety symbols is to attract your attention to possible hazardous conditions. This manual uses a series of symbols and signal words intended to convey the level of importance of the safety messages. The progression of symbols is described below. Remember that safety messages by themselves do not eliminate danger and are not a substitute for proper accident prevention measures. Always use common sense and good judgment.



Indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.



Indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury. It may also be used to alert against unsafe practices.

**NOTICE**

This symbol is used to alert the user to useful information about proper operation of the machine.

## Safety Instructions for Machinery



**OWNER'S MANUAL.** Read and understand this owner's manual **BEFORE** using machine.

**TRAINED OPERATORS ONLY.** Untrained operators have a higher risk of being hurt or killed. Only allow trained/supervised people to use this machine. When machine is not being used, disconnect power, remove switch keys, or lock-out machine to prevent unauthorized use—especially around children. Make workshop kid proof!

**DANGEROUS ENVIRONMENTS.** Do not use machinery in areas that are wet, cluttered, or have poor lighting. Operating machinery in these areas greatly increases the risk of accidents and injury.

**MENTAL ALERTNESS REQUIRED.** Full mental alertness is required for safe operation of machinery. Never operate under the influence of drugs or alcohol, when tired, or when distracted.

**ELECTRICAL EQUIPMENT INJURY RISKS.** You can be shocked, burned, or killed by touching live electrical components or improperly grounded machinery. To reduce this risk, only allow qualified service personnel to do electrical installation or repair work, and always disconnect power before accessing or exposing electrical equipment.

**DISCONNECT POWER FIRST.** Always disconnect machine from power supply **BEFORE** making adjustments, changing tooling, or servicing machine. This prevents an injury risk from unintended startup or contact with live electrical components.

**EYE PROTECTION.** Always wear ANSI-approved safety glasses or a face shield when operating or observing machinery to reduce the risk of eye injury or blindness from flying particles. Everyday eyeglasses are **NOT** approved safety glasses.





# WARNING

**WEARING PROPER APPAREL.** Do not wear clothing, apparel or jewelry that can become entangled in moving parts. Always tie back or cover long hair. Wear non-slip footwear to avoid accidental slips, which could cause loss of workpiece control.

**HAZARDOUS DUST.** Dust created while using machinery may cause cancer, birth defects, or long-term respiratory damage. Be aware of dust hazards associated with each workpiece material, and always wear a NIOSH-approved respirator to reduce your risk.

**HEARING PROTECTION.** Always wear hearing protection when operating or observing loud machinery. Extended exposure to this noise without hearing protection can cause permanent hearing loss.

**REMOVE ADJUSTING TOOLS.** Tools left on machinery can become dangerous projectiles upon startup. Never leave chuck keys, wrenches, or any other tools on machine. Always verify removal before starting!

**USE CORRECT TOOL FOR THE JOB.** Only use this tool for its intended purpose—do not force it or an attachment to do a job for which it was not designed. Never make unapproved modifications—modifying tool or using it differently than intended may result in malfunction or mechanical failure that can lead to personal injury or death!

**AWKWARD POSITIONS.** Keep proper footing and balance at all times when operating machine. Do not overreach! Avoid awkward hand positions that make workpiece control difficult or increase the risk of accidental injury.

**CHILDREN & BYSTANDERS.** Keep children and bystanders at a safe distance from the work area. Stop using machine if they become a distraction.

**GUARDS & COVERS.** Guards and covers reduce accidental contact with moving parts or flying debris. Make sure they are properly installed, undamaged, and working correctly.

**FORCING MACHINERY.** Do not force machine. It will do the job safer and better at the rate for which it was designed.

**NEVER STAND ON MACHINE.** Serious injury may occur if machine is tipped or if the cutting tool is unintentionally contacted.

**STABLE MACHINE.** Unexpected movement during operation greatly increases risk of injury or loss of control. Before starting, verify machine is stable and mobile base (if used) is locked.

**USE RECOMMENDED ACCESSORIES.** Consult this owner's manual or the manufacturer for recommended accessories. Using improper accessories will increase the risk of serious injury.

**UNATTENDED OPERATION.** To reduce the risk of accidental injury, turn machine **OFF** and ensure all moving parts completely stop before walking away. Never leave machine running while unattended.

**MAINTAIN WITH CARE.** Follow all maintenance instructions and lubrication schedules to keep machine in good working condition. A machine that is improperly maintained could malfunction, leading to serious personal injury or death.

**CHECK DAMAGED PARTS.** Regularly inspect machine for any condition that may affect safe operation. Immediately repair or replace damaged or mis-adjusted parts before operating machine.

**MAINTAIN POWER CORDS.** When disconnecting cord-connected machines from power, grab and pull the plug—NOT the cord. Pulling the cord may damage the wires inside. Do not handle cord/plug with wet hands. Avoid cord damage by keeping it away from heated surfaces, high traffic areas, harsh chemicals, and wet/damp locations.

**EXPERIENCING DIFFICULTIES.** If at any time you experience difficulties performing the intended operation, stop using the machine! Contact our Technical Support at (570) 546-9663.



# Additional Safety for Metal Lathes

## WARNING

**SPEED RATES.** Operating the lathe at the wrong speed can cause nearby parts to break or the workpiece to come loose, which will result in dangerous projectiles that could cause severe impact injuries. Large or non-concentric workpieces must be turned at slow speeds. Always use the appropriate feed and speed rates.

**CHUCK KEY SAFETY.** A chuck key left in the chuck can become a deadly projectile when the spindle is started. Always remove the chuck key after using it. Develop a habit of not taking your hand off of a chuck key unless it is away from the machine.

**SAFE CLEARANCES.** Workpieces that crash into other components on the lathe may throw dangerous projectiles in all directions, leading to impact injury and damaged equipment. Before starting the spindle, make sure the workpiece has adequate clearance by hand-rotating it through its entire range of motion. Also, check the tool and tool post clearance, chuck clearance, and saddle clearance.

**LONG STOCK SAFETY.** Long stock can whip violently if not properly supported, causing serious impact injury and damage to the lathe. Reduce this risk by supporting any stock that extends from the chuck/headstock more than three times its own diameter. Always turn long stock at slow speeds.

**SECURING WORKPIECE.** An improperly secured workpiece can fly off the lathe spindle with deadly force, which can result in a severe impact injury. Make sure the workpiece is properly secured in the chuck or faceplate before starting the lathe.

**CHUCKS.** Chucks are very heavy and difficult to grasp, which can lead to crushed fingers or hands if mishandled. Get assistance when handling chucks to reduce this risk. Protect your hands and the precision-ground ways by using a chuck cradle or piece of plywood over the ways of the lathe when servicing chucks. Use lifting devices when necessary.

**CLEARING CHIPS.** Metal chips can easily cut bare skin—even through a piece of cloth. Avoid clearing chips by hand or with a rag. Use a brush or vacuum to clear metal chips.

**STOPPING SPINDLE BY HAND.** Stopping the spindle by putting your hand on the workpiece or chuck creates an extreme risk of entanglement, impact, crushing, friction, or cutting hazards. Never attempt to slow or stop the lathe spindle with your hand. Allow the spindle to come to a stop on its own or use the brake.

**CRASHES.** Aggressively driving the cutting tool or other lathe components into the chuck may cause an explosion of metal fragments, which can result in severe impact injuries and major damage to the lathe. Reduce this risk by releasing automatic feeds after use, not leaving lathe unattended, and checking clearances before starting the lathe. Make sure no part of the tool, tool holder, compound rest, cross slide, or carriage will contact the chuck during operation.

**COOLANT SAFETY.** Coolant is a very poisonous biohazard that can cause personal injury from skin contact alone. Incorrectly positioned coolant nozzles can splash on the operator or the floor, resulting in an exposure or slipping hazard. To decrease your risk, change coolant regularly and position the nozzle where it will not splash or end up on the floor.

**TOOL SELECTION.** Cutting with an incorrect or dull tool increases the risk of accidental injury due to the extra force required for the operation, which increases the risk of breaking or dislodging components that can cause small shards of metal to become dangerous projectiles. Always select the right cutter for the job and make sure it is sharp. A correct, sharp tool decreases strain and provides a better finish.



# Additional Chuck Safety

## WARNING

**ENTANGLEMENT.** Entanglement with a rotating chuck can lead to death, amputation, broken bones, or other serious injury. Never attempt to slow or stop the lathe chuck by hand, and always roll up long sleeves, tie back long hair, and remove any jewelry or loose apparel BEFORE operating.

**CHUCK SPEED RATING.** Excessive spindle speeds greatly increase the risk of the workpiece or chuck being thrown from the machine with deadly force. Never use spindle speeds faster than the chuck RPM rating or the safe limits of your workpiece.

**USING CORRECT EQUIPMENT.** Many workpieces can only be safely turned in a lathe if additional support equipment, such as a tailstock or steady/follow rest, is used. If the operation is too hazardous to be completed with the lathe or existing equipment, the operator must have enough experience to know when to use a different machine or find a safer way.

**TRAINED OPERATORS ONLY.** Using a chuck incorrectly can result in workpieces coming loose at high speeds and striking the operator or bystanders with deadly force. To reduce the risk of this hazard, read and understand this document and seek additional training from an experienced chuck user before using a chuck.

**CHUCK CAPACITY.** Avoid exceeding the capacity of the chuck by clamping an oversized workpiece. If the workpiece is too large to safely clamp with the chuck, use a faceplate or a larger chuck if possible. Otherwise, the workpiece could be thrown from the lathe during operation, resulting in serious impact injury or death.

**CLAMPING FORCE.** Inadequate clamping force can lead to the workpiece being thrown from the chuck and striking the operator or bystanders. Maximum clamping force is achieved when the chuck is properly maintained and lubricated, all jaws are fully engaged with the workpiece, and the maximum chuck clamping diameter is not exceeded.

**PROPER MAINTENANCE.** All chucks must be properly maintained and lubricated to achieve maximum clamping force and withstand the rigors of centrifugal force. To reduce the risk of a thrown workpiece, follow all maintenance intervals and instructions in this document.

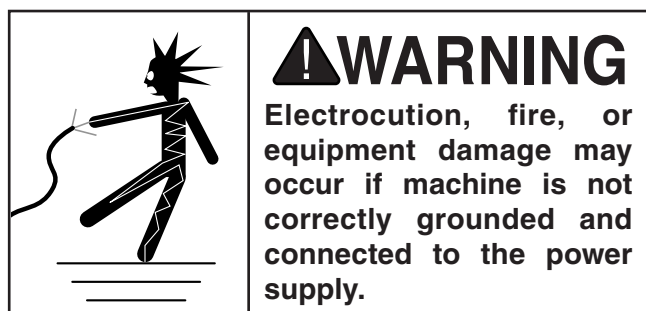
**DISCONNECT POWER.** Serious entanglement or impact injuries could occur if the lathe is started while you are adjusting, servicing, or installing the chuck. Always disconnect the lathe from power before performing these procedures.



# SECTION 2: POWER SUPPLY

## Availability

Before installing the machine, consider the availability and proximity of the required power supply circuit. If an existing circuit does not meet the requirements for this machine, a new circuit must be installed. To minimize the risk of electrocution, fire, or equipment damage, installation work and electrical wiring must be done by an electrician or qualified service personnel in accordance with all applicable codes and standards.



## Full-Load Current Rating

The full-load current rating is the amperage a machine draws at 100% of the rated output power. On machines with multiple motors, this is the amperage drawn by the largest motor or sum of all motors and electrical devices that might operate at one time during normal operations.

**Full-Load Current Rating ..... 30.35 Amps**

The full-load current is not the maximum amount of amps that the machine will draw. If the machine is overloaded, it will draw additional amps beyond the full-load rating.

If the machine is overloaded for a sufficient length of time, damage, overheating, or fire may result—especially if connected to an undersized circuit. To reduce the risk of these hazards, avoid overloading the machine during operation and make sure it is connected to a power supply circuit that meets the requirements in the following section.

## Circuit Requirements for 220V

This machine is prewired to operate on a 220V power supply circuit that has a verified ground and meets the following requirements:

**Nominal Voltage ..... 220V**  
**Cycle ..... 60 Hz**  
**Phase ..... 3-Phase**  
**Power Supply Circuit ..... 40 Amps**  
**Connection Type ..... Hardwire**

A power supply circuit includes all electrical equipment between the breaker box or fuse panel in the building and the machine. The power supply circuit used for this machine must be sized to safely handle the full-load current drawn from the machine for an extended period of time. (If this machine is connected to a circuit protected by fuses, use a time delay fuse marked D.)

## ! CAUTION

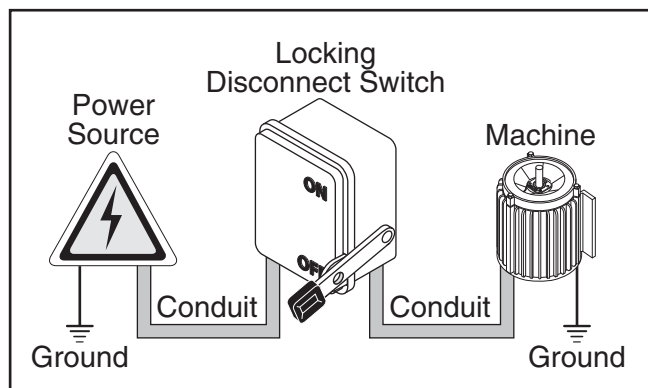
**For your own safety and protection of property, consult an electrician if you are unsure about wiring practices or electrical codes in your area.**

**Note:** *The circuit requirements listed in this manual apply to a dedicated circuit—where only one machine will be running at a time. If this machine will be connected to a shared circuit where multiple machines will be running at the same time, consult a qualified electrician to ensure that the circuit is properly sized for safe operation.*



## Connection Type

A permanently connected (hardwired) power supply is typically installed with wires running through mounted and secured conduit. A disconnecting means, such as a locking switch (see following figure), must be provided to allow the machine to be disconnected (isolated) from the power supply when required. This installation must be performed by an electrician in accordance with all applicable electrical codes and ordinances.



**Figure 10.** Typical setup of a permanently connected machine.

## Grounding Instructions

In the event of a malfunction or breakdown, grounding provides a path of least resistance for electrical current to reduce the risk of electric shock. A permanently connected machine must be connected to a grounded metal permanent wiring system; or to a system having an equipment-grounding conductor. All grounds must be verified and rated for the electrical requirements of the machine. Improper grounding can increase the risk of electric shock!

### **! WARNING**

**Serious injury could occur if you connect the machine to power before completing the setup process. DO NOT connect to power until instructed later in this manual.**

## Extension Cords

Since this machine must be permanently connected to the power supply, an extension cord cannot be used.

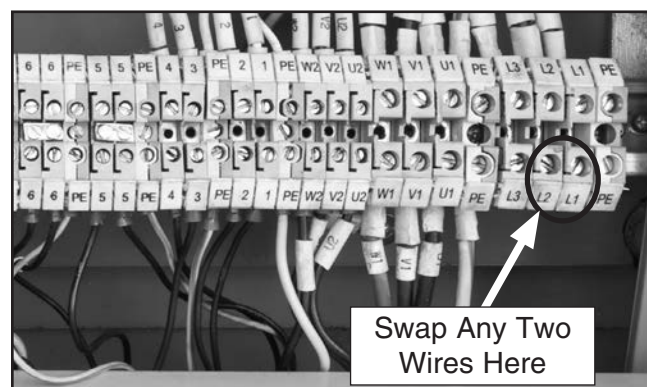
# Correcting Phase Polarity

This sub-section is only provided for troubleshooting. If you discover that the lathe will not operate, or that the spindle runs backwards, the lathe may be wired out of phase.

Correcting phase polarity requires reversing the positions where two incoming power source wires are connected. Due to the high voltage and risk of serious shock involved, we strongly recommend this procedure only be done by an electrician or qualified service personnel.

**To correct the phase polarity of the incoming power supply:**

1. DISCONNECT MACHINE FROM POWER!
2. Open electrical box located at back of machine.
3. Swap the incoming L1 and L2 wire positions on the terminals shown in **Figure 11**.



**Figure 11.** Swapping power connections to correct out-of-phase wiring.

3. Close and latch electrical box.
4. Reconnect machine to power supply.





# SECTION 3: SETUP

## Preparation

The list below outlines the basic process of preparing your machine for operation. Specific steps are covered later in this section.

**The typical preparation process is as follows:**

1. Unpack the lathe and inventory the contents of the box/crate.
2. Clean the lathe and its components.
3. Identify an acceptable location for the lathe and move it to that location.
4. Level the lathe and bolt it to the floor, or place it on leveling pads.
5. Assemble the loose components and make any necessary adjustments or inspections to ensure the lathe is ready for operation.
6. Check lathe for proper lubrication.
7. Connect the lathe to the power source.
8. Test run lathe to ensure it functions properly.
9. Perform the spindle break-in procedure to prepare the lathe for operation.

## Unpacking

Your machine was carefully packaged for safe transportation. Remove the packaging materials from around your machine and inspect it. If you discover any damage, *please call us immediately at (570) 546-9663 for advice.*

Save the containers and all packing materials for possible inspection by the carrier or its agent. *Otherwise, filing a freight claim can be difficult.*

When you are completely satisfied with the condition of your shipment, inventory the contents.



## Needed for Setup

The following are needed to complete the setup process, but are not included with your machine.

- **For Lifting and Moving:**
  - A forklift or other power lifting device rated for at least 6800 lbs.
  - Two lifting straps rated for at least 6800 lbs. each
  - 1" diameter x 49" long steel barstock
  - Two people to guide machine
- **For Power Connection:**
  - A power source that meets the minimum circuit requirements for this machine (review **Power Supply** on **Page 18** for details)
  - An electrician or qualified service personnel to ensure a safe and code-compliant connection to the power source
- **For Assembly:**
  - Shop rags
  - Cleaner/degreaser (see **Page 22**)
  - Quality metal protectant lubricant
  - Safety glasses for each person
  - Floor mounting hardware as needed (see **Page 25**)
  - Precision level at least 1" long





# Inventory

The following is a list of items shipped with your machine. Before beginning setup, lay these items out and inventory them.

If any non-proprietary parts are missing (e.g. a nut or a washer), we will gladly replace them; or for the sake of expediency, replacements can be obtained at your local hardware store.

Main Components (Figure 12)		Qty.
A.	Three-Jaw Chuck 10" (Installed)	1
B.	Steady Rest	1
C.	Follow Rest	1
D.	4-Way Tool Post	1
E.	Backsplash	1
F.	Tailstock	1

Packaged Components (Figure 13)		
G.	Faceplate 17"	1
H.	Four-Jaw Chuck 12"	1
I.	Drive Plate	1
J.	4-Jaw Chuck Wrench	1
K.	Camlock Studs (6 Installed)	18
L.	Cap Screws M6-1 x 14 (6 Installed)	18
M.	Three-Jaw Chuck Outside Jaws	3
N.	Spanner Wrenches	2
O.	Tapered Spindle Sleeve MT-7-#5	1
P.	Standard Dead Centers MT#5	2
Q.	Tool Box	1
R.	Spindle Wrench	1
S.	3-Jaw Chuck Wrench	1
T.	Tool Post T-Wrench	1
U.	Spare Change Gear 72T	1
V.	Spare Change Gear 36T	1
W.	Wrenches 10/13, 17, 19/24, 36 mm	1 ea
X.	Cast Iron Leveling Pads	8
Y.	Hex Wrenches 5, 6, 8, 10 mm	1 ea
Z.	Oil Gun	1
AA.	Spare Brake Belts	2
AB.	Leveling Bolts M16-2 x 45	8
AC.	Hex Nuts M16-2	8
AD.	Carriage Handwheel Handle	1
AE.	Cross Slide Handwheel	1

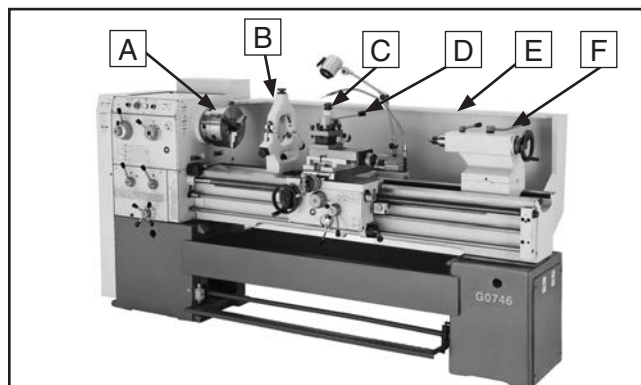


Figure 12. Main components.

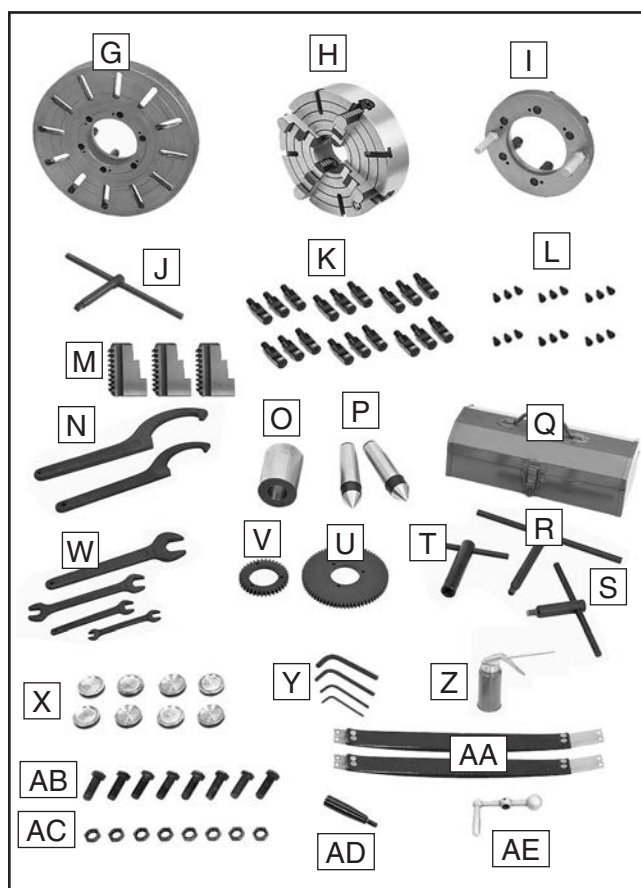


Figure 13. Packaged components.

## NOTICE

If you cannot find an item on this list, carefully check around/inside the machine and packaging materials. Often, these items get lost in packaging materials while unpacking or they are pre-installed at the factory.



# Cleanup

The unpainted surfaces of your machine are coated with a heavy-duty rust preventative that prevents corrosion during shipment and storage. This rust preventative works extremely well, but it will take a little time to clean.

Be patient and do a thorough job cleaning your machine. The time you spend doing this now will give you a better appreciation for the proper care of your machine's unpainted surfaces.


There are many ways to remove this rust preventative, but the following steps work well in a wide variety of situations. Always follow the manufacturer's instructions with any cleaning product you use and make sure you work in a well-ventilated area to minimize exposure to toxic fumes.

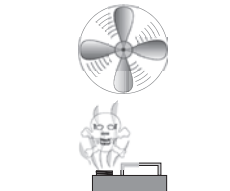
## Before cleaning, gather the following:

- Disposable rags
- Cleaner/degreaser (WD-40 works well)
- Safety glasses & disposable gloves
- Plastic paint scraper (optional)

## Basic steps for removing rust preventative:

1. Put on safety glasses.
2. Coat the rust preventative with a liberal amount of cleaner/degreaser, then let it soak for 5–10 minutes.
3. Wipe off the surfaces. If your cleaner/degreaser is effective, the rust preventative will wipe off easily. If you have a plastic paint scraper, scrape off as much as you can first, then wipe off the rest with the rag.
4. Repeat **Steps 2–3** as necessary until clean, then coat all unpainted surfaces with a quality metal protectant to prevent rust.

	<b>⚠ WARNING</b> Gasoline and petroleum products have low flash points and can explode or cause fire if used to clean machinery. Avoid using these products to clean machinery.
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	<b>⚠ CAUTION</b> Many cleaning solvents are toxic if inhaled. Only work in a well-ventilated area.
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<b>NOTICE</b> Avoid chlorine-based solvents, such as acetone or brake parts cleaner, that may damage painted surfaces.
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## T23692—Orange Power Degreaser

A great product for removing the waxy shipping grease from your machine during clean up.

<p>Call <b>1-800-523-4777</b> To Order</p>	
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**Figure 14.** T23692 Orange Power Degreaser.



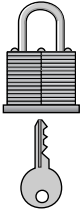
# Site Considerations

## Weight Load

Refer to the **Machine Data Sheet** for the weight of your machine. Make sure that the surface upon which the machine is placed will bear the weight of the machine, additional equipment that may be installed on the machine, and the heaviest workpiece that will be used. Additionally, consider the weight of the operator and any dynamic loading that may occur when operating the machine.

## Space Allocation

Consider the largest size of workpiece that will be processed through this machine and provide enough space around the machine for adequate operator material handling or the installation of auxiliary equipment. With permanent installations, leave enough space around the machine to open or remove doors/covers as required by the maintenance and service described in this manual. **See below for required space allocation.**



**CAUTION**

Children or untrained people may be seriously injured by this machine. Only install in an access restricted location.

## Physical Environment

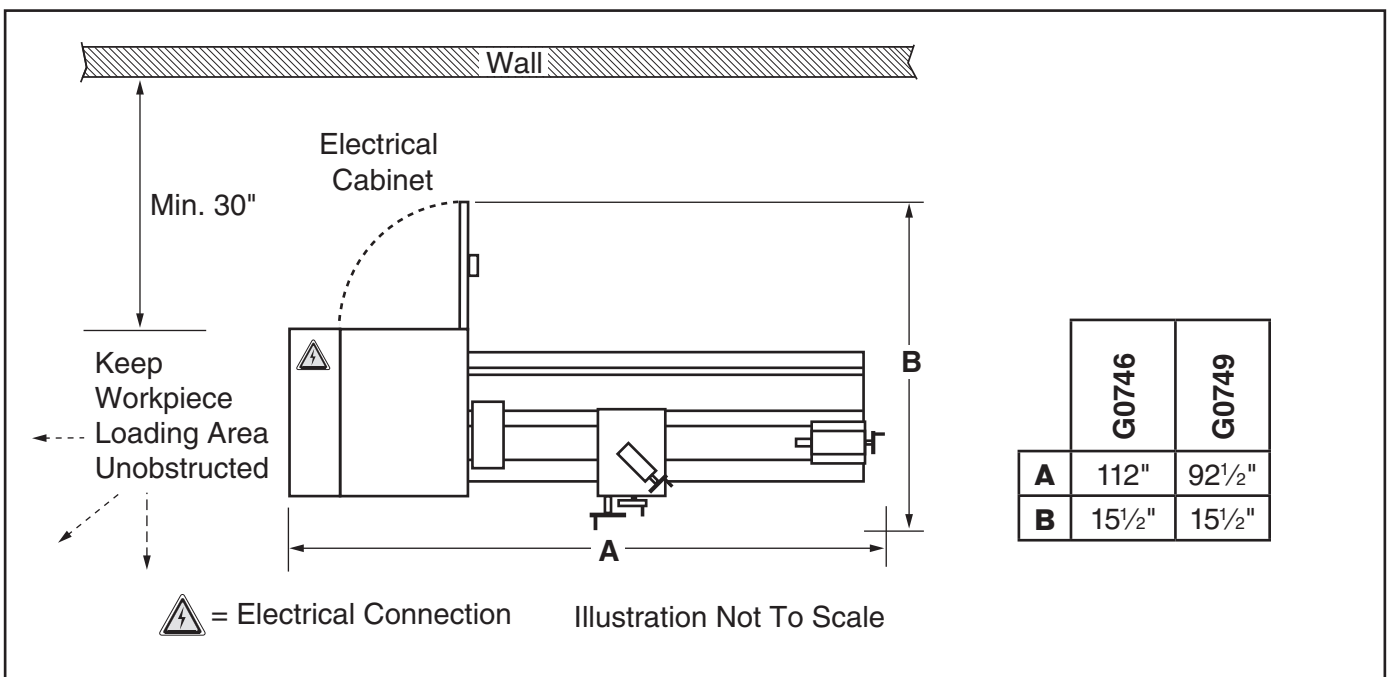
The physical environment where the machine is operated is important for safe operation and longevity of machine components. For best results, operate this machine in a dry environment that is free from excessive moisture, hazardous chemicals, airborne abrasives, or extreme conditions. Extreme conditions for this type of machinery are generally those where the ambient temperature range exceeds 41°–104°F; the relative humidity range exceeds 20–95% (non-condensing); or the environment is subject to vibration, shocks, or bumps.

## Electrical Installation

Place this machine near an existing power source. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Make sure to leave access to a means of disconnecting the power source or engaging a lockout/tagout device, if required.

## Lighting

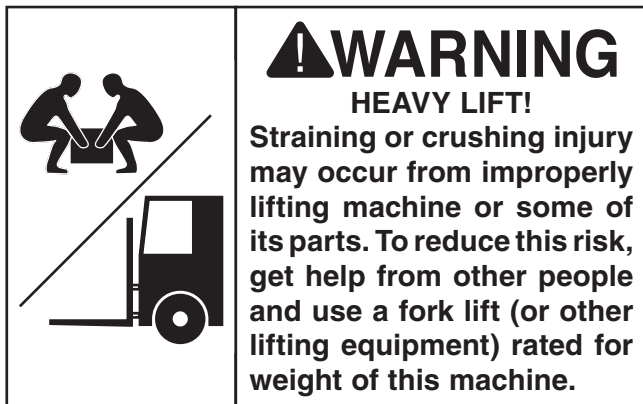
Lighting around the machine must be adequate enough that operations can be performed safely. Shadows, glare, or strobe effects that may distract or impede the operator must be eliminated.



**Figure 15.** Minimum working clearances.



# Lifting & Placing



Do not attempt to lift or move this lathe without using the proper lifting equipment (such as forklift or crane) or the necessary assistance from other people. Each piece of lifting equipment must be rated for at least 6800 lbs to support dynamic loads that may be applied while lifting. Refer to **Needed for Setup** on **Page 20** for details.

## To lift and move the lathe:

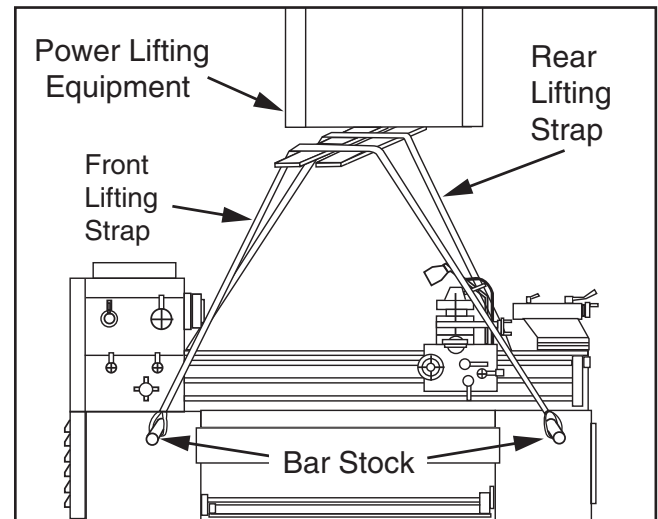
1. Remove the shipping crate top and sides, then remove the small components from the shipping pallet.
2. Move the lathe to its prepared location while it is still attached to the shipping pallet.
3. Unbolt the lathe from the shipping pallet.
4. To balance the load for lifting, move the tailstock and carriage to the extreme right end of the bedway, then lock them in place.

**Note:** Before attempting to move the carriage, make sure the carriage lock is loose, the half nut is disengaged, and the power feed is disengaged (feed selection lever).

5. Remove the splash guard so it does not get damaged when the lathe is raised.

6. Insert round steel bar stock through the four lifting holes (see **Figure 16**).

**Note:** To properly support the lathe and avoid damaging lathe components, bar stock should be at least 1" diameter thick and 49" long, so it projects 14" from both sides of the lathe when installed.



**Figure 16.** Example of lathe setup for lifting.

7. Attach the lifting straps to the bar stock and the power lifting equipment (see **Figure 16**). Make sure there is enough space between the straps and the control rod, feed rod, leadscrew and electrical cabinet to prevent putting pressure on these components when lifting.
8. Raise the lathe a couple of inches and check the balance of the load. Have two other people carefully steady the lathe to help prevent it from swinging.
  - If the load is not safely balanced, immediately lower the lathe and resolve the issue before attempting to lift it again.
9. Raise the lathe enough to clear the shipping pallet and carefully remove the pallet.
  - If you plan to use the included leveling bolts and hex nuts to level the lathe, install them now.
10. Lower the lathe into position.
11. Re-install the splash guard.



# Anchoring to Floor

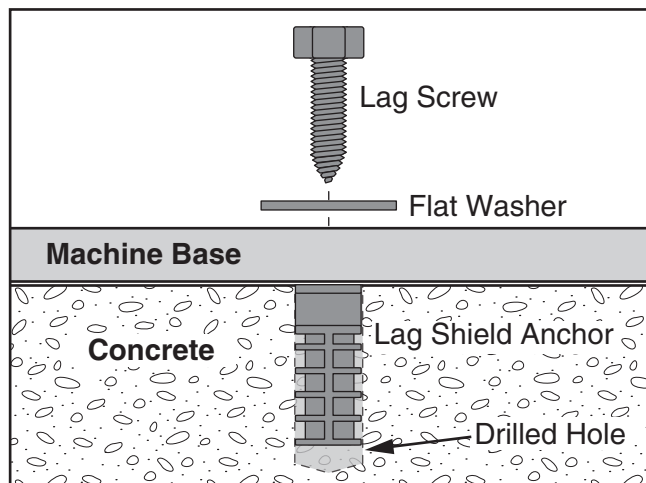
Anchoring machinery to the floor prevents tipping or shifting and reduces vibration that may occur during operation, resulting in a machine that runs slightly quieter and feels more solid.

If the machine will be installed in a commercial or workplace setting, or if it is permanently connected (hardwired) to the power supply, local codes may require that it be anchored to the floor.

If not required by any local codes, fastening the machine to the floor is an optional step. If you choose not to do this with your machine, we recommend placing it on machine mounts, as these provide an easy method for leveling and they have vibration-absorbing pads.

## Anchoring to Concrete Floors

Lag shield anchors with lag screws (see below) are a popular way to anchor machinery to a concrete floor, because the anchors sit flush with the floor surface, making it easy to unbolt and move the machine later, if needed. However, anytime local codes apply, you **MUST** follow the anchoring methodology specified by the code.



**Figure 17.** Popular method for anchoring machinery to a concrete floor.

# Leveling

## **NOTICE**

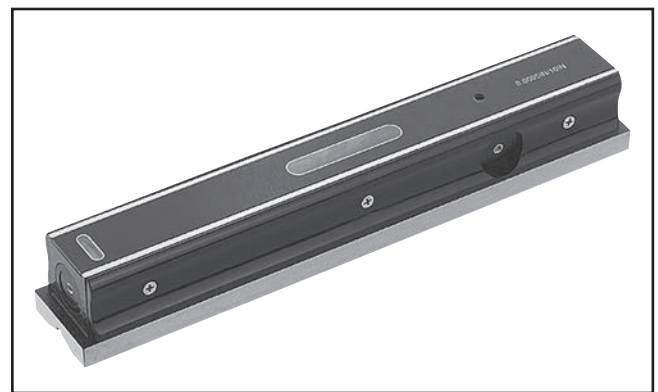
**For accurate turning results and to prevent warping the cast iron bed and ways, the lathe bedways **MUST** be leveled from side-to-side and from front-to-back on both ends.**

**Re-check the bedways 24 hours after installation, two weeks after that, and then annually to make sure they remain level.**

Leveling machinery helps precision components, such as bedways, remain straight and flat during the lifespan of the machine. Components on a machine that is not level may slowly twist due to the dynamic loads placed on the machine during operation.

For best results, use a precision level that is at least 12" long and sensitive enough to show a distinct movement when a 0.003" shim (approximately the thickness of one sheet of standard newspaper) is placed under one end of the level.

See the figure below for an example of a high precision level offered by Grizzly.



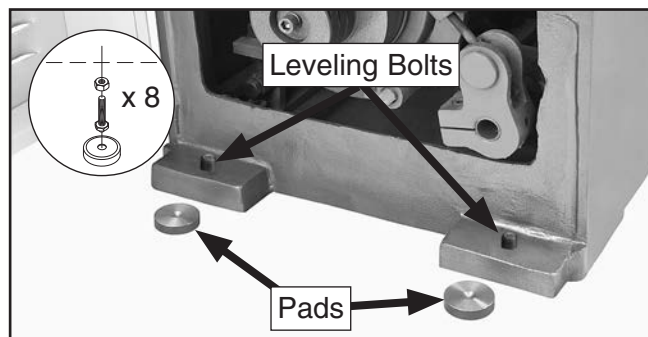
**Figure 18.** Model H2683 precision level.

*Continued on next page* →



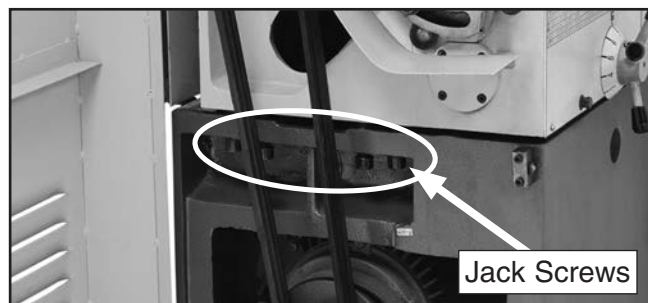


- If using the included leveling pads (see **Figure 19**), thread the leveling bolts with the hex nuts into the bottom of the stand, place the pads under the bolts, then adjust them to level the machine.

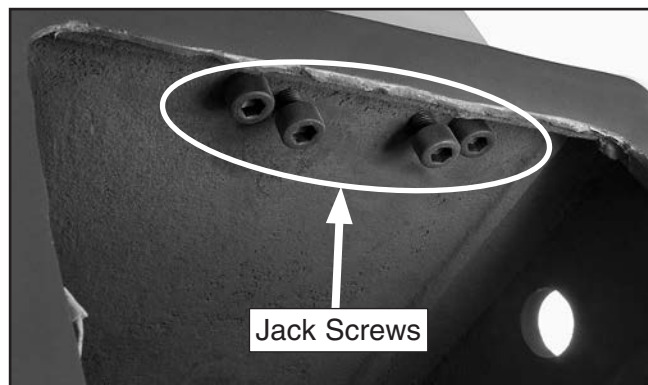


**Figure 19.** Leveling pads, bolts (hex nuts not shown).

For additional leveling, use the jack screws under the headstock and tailstock (see **Figures 20 and 21**). To access the tailstock-end jack screws, remove the coolant motor cover.



**Figure 20.** Location of headstock jack screws.



**Figure 21.** Tailstock-end jack screws.

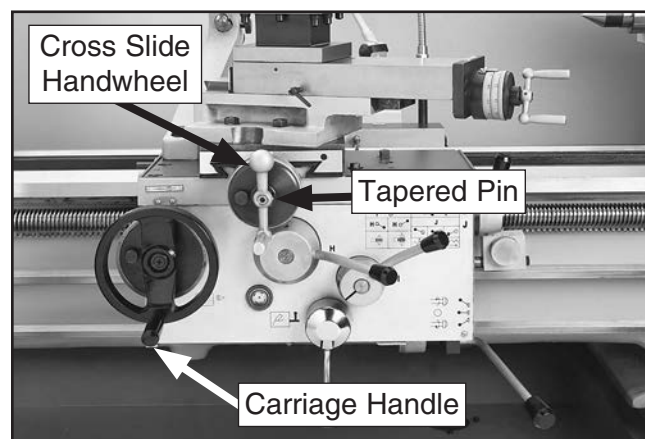
- If using mounting hardware that does not allow for adjustment, level the lathe by placing metal shims between the lathe base and the floor before anchoring it.

## Assembly

With the exception of the carriage handle and cross slide handwheel, the lathe is shipped fully assembled.

Use a 5mm hex wrench to thread the carriage handle into the carriage handwheel.

Slide the cross slide handwheel onto the shaft and secure it with the included tapered pin, as shown in **Figure 22**.



**Figure 22.** Handwheel handles installed.



# Lubricating Lathe

---



The headstock, gearbox, and apron oil reservoirs must have the proper amount of oil in them before the lathe can be operated.

Damage caused to the bearings and gears from running the lathe without oil in the reservoirs will not be covered under warranty. Refer to the **Lubrication** section, beginning on **Page 67**, for checking and adding oil.

In addition to the reservoirs, we also recommend that you lubricate all other points on the machine at this time. To do this, follow the steps provided in the maintenance schedule on **Page 66**.

**Note:** *If this lathe was shipped with oil in the reservoirs, do not change that oil until after the **Test Run and Spindle Break-In** procedures.*

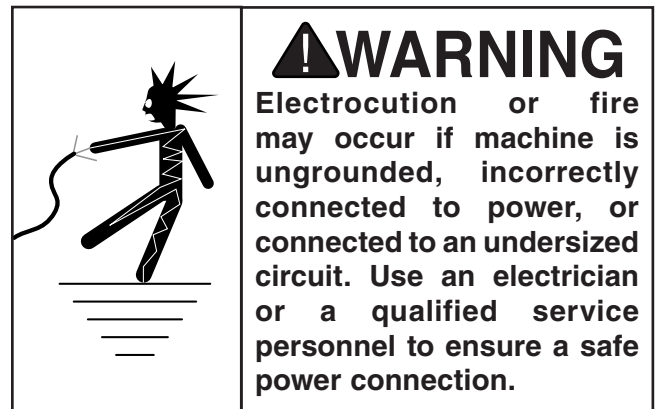
## Adding Coolant

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Add the coolant of your choice now. For detailed instructions on where the coolant tank is located and how to add fluid, refer to **Coolant System Service** on **Page 72**.

# Power Connection

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Before the machine can be connected to the power source, an electrical circuit and connection device must be prepared according to the circuit requirements on the **Page 18**, and the machine must be completely setup and installed in its permanent location.

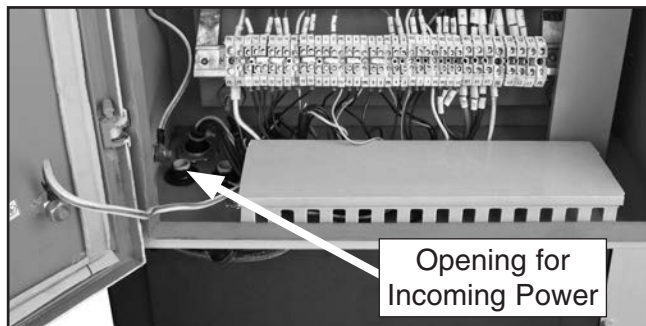
Once the lathe is connected to the power supply, the disconnect switch that is installed by the electrician (as recommended) is the primary means for disconnecting or connecting the machine to the power source.

**Note About Phase Converters:** *Due to the startup load from this machine, we do not recommend using a static phase converter to create 3-phase power—as it can quickly decrease the life of electrical components on this machine. If you must use a phase converter, only use a rotary phase converter. Only connect the manufactured leg or "wild wire" to the L3 terminal (see location in **Figure 24** on **Page 28**). The L3 terminal can handle power fluctuation because it is wired directly to the motor.*



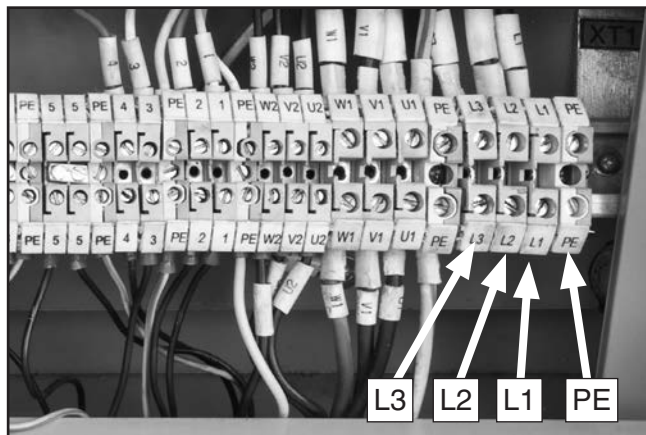
## To connect lathe to power:

1. Make sure the main power switch on the lathe electrical cabinet is turned to the OFF position, then open the door.
2. Insert the incoming power wires through the opening shown in **Figure 23**.



**Figure 23.** Location of opening in electrical cabinet for incoming power.

3. Connect the incoming hot wires to the **L1**, **L2**, and **L3** terminals, shown in **Figure 24**. Connect the incoming ground to the grounding terminal (**PE**).



**Figure 24.** Location to connect incoming hot wires and ground wire.

4. Make sure the wires have enough slack so they are not pulled tight or stretched.
5. Close the main electrical cabinet door.

## Test Run

Once the assembly is complete, test run your machine to make sure it runs properly and is ready for regular operation.

### The test run consists of verifying:

- The motor powers up and runs correctly.
- The motor turns in the correct direction (machine is not wired out of phase).
- The safety features work correctly.
- The brake system works correctly.
- The coolant system works correctly.

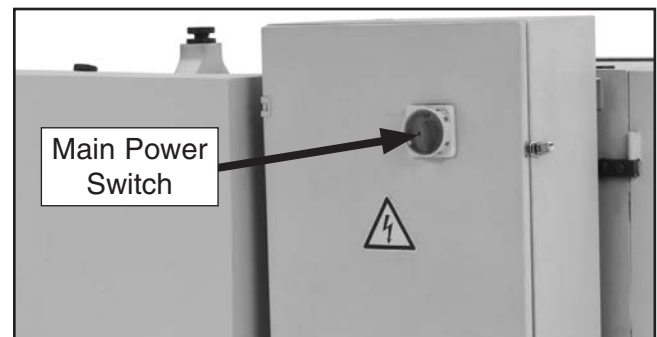
If you notice an unusual noise or vibration, stop using the machine immediately, and remedy before operating it further.

## !WARNING

Before starting the lathe, make sure you have performed the preceding assembly and adjustment instructions, and you have read all the documentation provided with the lathe and are familiar with the various functions and safety features on this machine. Failure to follow this warning could result in serious personal injury or even death!

### To test run your machine:

1. Make sure the main power switch (see **Figure 25**) is turned OFF.



**Figure 25.** Location of the main power switch.



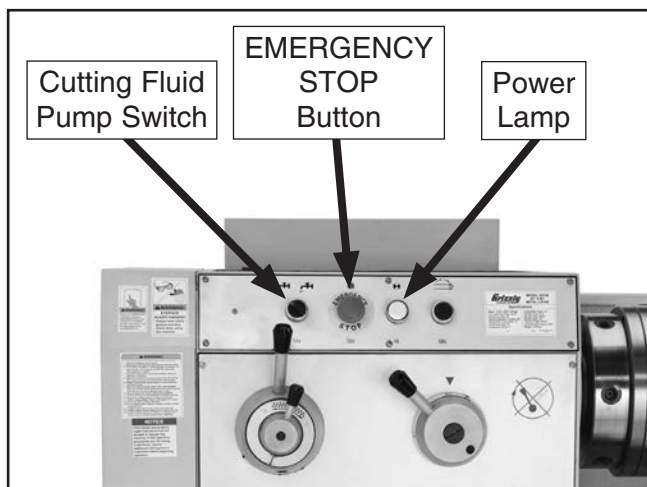
2. Read and follow the safety instructions at the beginning of the manual, take all required safety precautions, and make sure all previous preparation steps discussed in this manual have been followed and completed.

3. Clear away all tools and objects used during assembly, lubrication, and preparation.

4. Make sure that the chuck and jaws, if installed, are secure.

**Note:** If a chuck is not installed on the lathe, you do not need to install one for this test.

5. Push the EMERGENCY STOP button on the control panel (see **Figure 26**), and point the coolant nozzle into the chip pan.

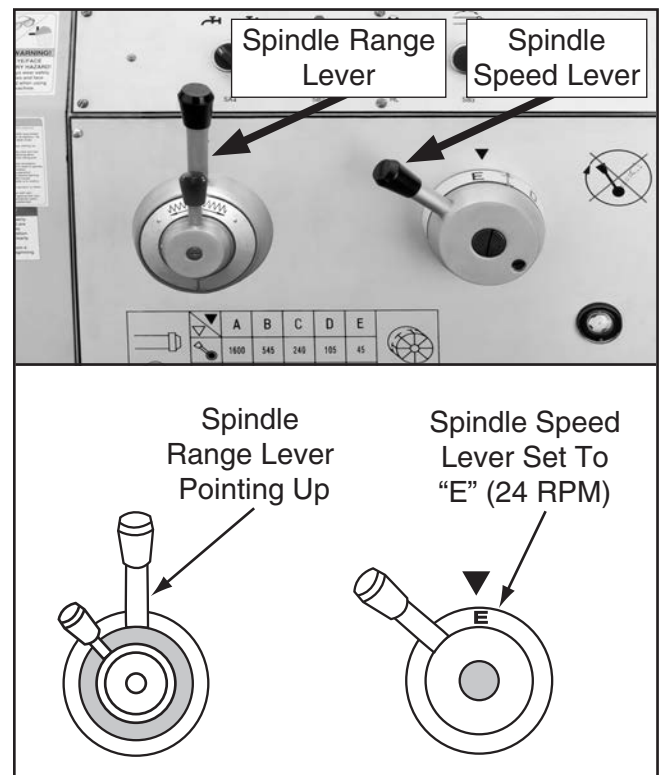


**Figure 26.** Control panel buttons used in test run.

**Note:** In the next step, you may need to rock the chuck back and forth as you make the adjustments, so that the gears will mesh together.

6. Set the spindle speed to 24 RPM as follows:

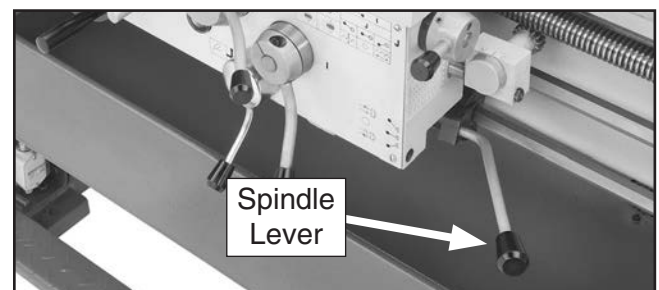
a. Position the spindle range lever straight up, so it aligns with the arrow on the headstock (see **Figure 27**).



**Figure 27.** Spindle speed set to 24 RPM.

b. Position the spindle speed lever so the "E" is directly under the black arrow on the headstock (see **Figure 27**).

7. Make sure the spindle lever is in the middle (OFF) position to prevent unexpected startup when power is enabled (see **Figure 28**).

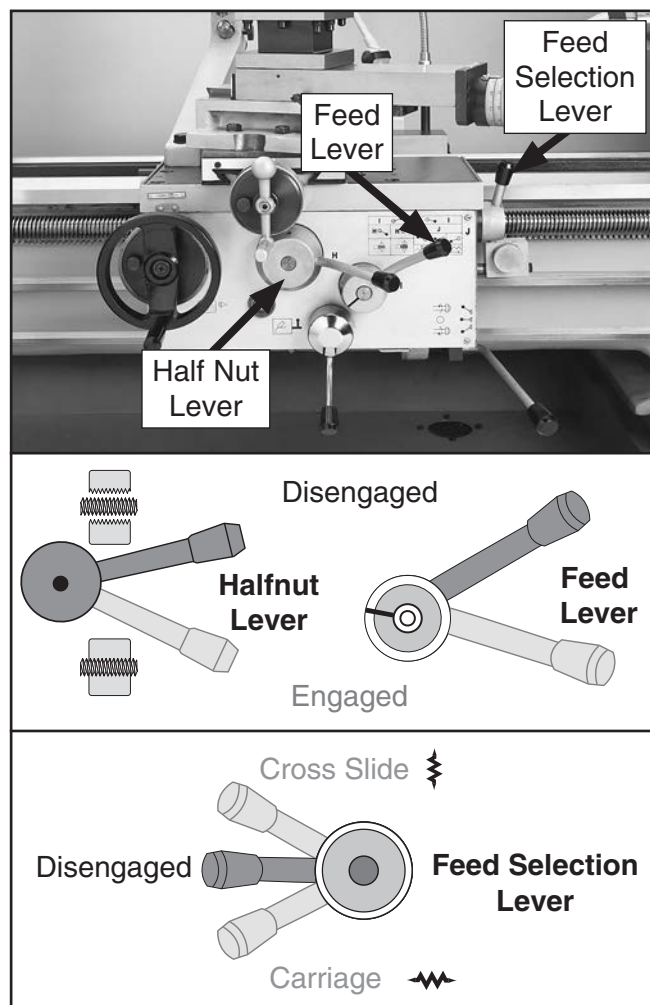


**Figure 28.** Spindle lever in middle (OFF) position.

8. Turn the main power switch ON and reset the EMERGENCY STOP button by twisting it clockwise until it pops out. The power lamp on the control panel should illuminate.

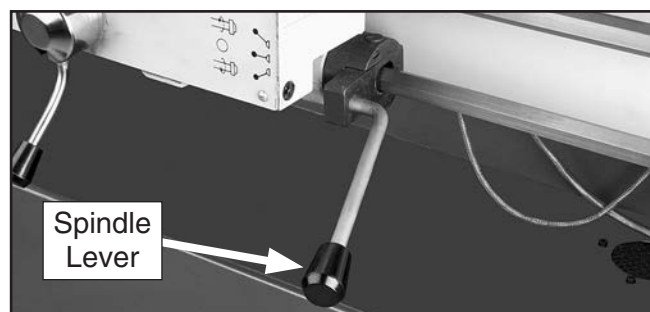


9. To ensure the carriage components do not unexpectedly move during the following steps, disengage the half nut lever, feed lever, and feed selection lever (see **Figure 29**).



**Figure 29.** Disengaging carriage components.

10. Turn the spindle **ON** by pulling the spindle lever out and moving it down (see **Figure 30**). Verify that the machine is operating correctly.



**Figure 30.** Spindle lever in down (forward) position.

—When operating correctly, the lathe runs smoothly with little or no vibration or rubbing noises.

—Investigate and correct strange or unusual noises or vibrations before operating the machine further. Always disconnect the machine from power when investigating or correcting potential problems.

11. With the spindle lever in the down position, verify the spindle is rotating counterclockwise—down and toward the front of the lathe.

—If the spindle and chuck *are not* rotating counterclockwise, the power supply may be connected out-of-phase. Stop the spindle, disconnect lathe from power, then follow the instructions in the **Correcting Phase Polarity** section on **Page 19**. After correcting the wiring, repeat **Steps 9–11**.

12. Press the EMERGENCY STOP button to turn the lathe **OFF**, then, without resetting the EMERGENCY STOP button, try to restart spindle rotation. The spindle should *not* start.

—If spindle rotation *does* start with the EMERGENCY STOP button pressed in, the EMERGENCY STOP button safety is not operating correctly. This safety feature must operate properly before continuing operation. Use the spindle lever to stop the lathe, disconnect it from power, and call Tech Support for help.

13. Move the spindle lever to the middle (OFF) position, and reset the EMERGENCY STOP button by twisting it clockwise until it pops out.

14. Restart spindle rotation.

15. Push the foot brake. The spindle should come to a quick stop.

—If the brake pedal has no effect on the lathe, push the EMERGENCY STOP button and call Tech Support for help.





16. Move the spindle lever to the middle (OFF) position. Open the end-gear cover on the left side of the headstock. This activates a safety switch that should prevent the spindle from starting while this cover is open.

**Note:** Remove the cap screw on the front of the cover to open it.

17. Stand away from all the exposed gears on the side of the headstock, and attempt to start spindle rotation. The spindle should *not* start.

—If spindle rotation *does start* with the end-gear cover open, the safety switch is not operating correctly. This safety feature must operate properly before continuing operation. Press the EMERGENCY STOP button to turn the lathe **OFF**, disconnect it from power, and call Tech Support for help.

18. Move the spindle lever to the OFF position, then close the end-gear cover.

19. Use the cutting fluid pump switch on the control panel to start the pump (see **Figure 26** on **Page 29**), then open the valve. Verify that the cutting fluid flows from the nozzle, then turn the pump **OFF**.

Congratulations! The test run is complete. Perform the following **Spindle Break-In** procedure.

## Spindle Break-In

---

Before subjecting the spindle to operational loads, it is essential to complete the break-in process. This helps ensure maximum life of spindle bearings and other precision components by thoroughly lubricating them before placing them under load.

After spindle break-in is complete, we recommend changing headstock and gearbox oil to remove any metal particles or debris that are present from the assembly and break-in process.

The break-in must be performed in succession with the **Test Run** procedure described in this manual, as the steps in that procedure prepare the lathe controls for the break-in process.

## NOTICE

**DO NOT** perform this procedure independently of the **Test Run** section. The lathe could be seriously damaged if the controls are set differently than instructed in that section.

### To perform the spindle break-in:

1. Successfully complete the **Test Run** procedure beginning on **Page 28**.
2. Run the lathe for 5 minutes in each direction at 24 RPM (first forward and then reverse).
3. Repeat **Step 2** for the remaining RPM ranges, progressively increasing in RPM. When these steps are complete, the lathe is broken in.

Congratulations! Spindle break-in is complete. We recommend changing the headstock and gearbox oil before operating the machine further (refer to **Lubrication** on **Page 67**).

## Recommended Adjustments

---

The following adjustments have been made at the factory. However, because of the many variables involved with shipping, we recommend you verify these adjustments to ensure the best results:

### Factory adjustments that should be verified:

- Tailstock alignment (see **Page 42**).
- Cross slide and compound slide backlash adjustment (see **Page 78**).
- Gib adjustments (see **Page 79**).

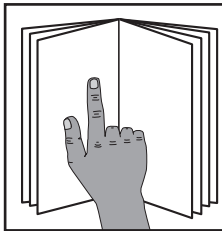


# SECTION 4: OPERATIONS

## Operation Overview

The purpose of this overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, so the machine controls/components discussed later in this manual are easier to understand.

Due to the generic nature of this overview, it is **not** intended to be an instructional guide. To learn more about specific operations, read this entire manual and seek additional training from experienced machine operators, and do additional research outside of this manual by reading "how-to" books, trade magazines, or websites.



### **WARNING**

To reduce your risk of serious injury, read this entire manual **BEFORE** using machine.



### **WARNING**

To reduce the risk of eye injury from flying chips always wear safety glasses.

### **NOTICE**

If you are not experienced with this type of machine, **WE STRONGLY RECOMMEND** that you seek additional training outside of this manual. Read books/magazines or get formal training before beginning any projects. Regardless of the content in this section, Grizzly Industrial will not be held liable for accidents caused by lack of training.

To complete a typical operation, the operator does the following:

1. Puts on safety glasses, rolls up sleeves, removes jewelry, and secures any clothing, jewelry, or hair that could get entangled in moving parts.
2. Examines the workpiece to make sure it is suitable for turning, then securely mounts it in the lathe.
3. Installs the tooling, aligns it with the workpiece, then backs it away to establish a safe startup clearance.
4. Removes all setup tools from the lathe.
5. Checks for safe clearances by rotating the workpiece by hand at least one full revolution.
6. Moves slides to where they will be used during operation.
7. Sets the correct spindle speed for the operation.
8. If using power feed, selects the proper feed rate for the operation.
9. Turns the main power switch ON and resets the EMERGENCY STOP button.
10. Uses the spindle lever to start spindle rotation.
11. Uses the carriage handwheels or power feed options to move the tooling into the workpiece for operations.
12. When finished cutting, moves the spindle lever to the OFF position, presses the foot brake to completely stop the spindle, then removes the workpiece.





# Chuck & Plate Mounting

This lathe is equipped with a D1-type spindle nose. This type of spindle uses camlocks that are adjusted with a chuck key to securely mount a chuck or faceplate with repeatable precision and ease.

## **⚠ WARNING**

**Never use spindle speeds faster than the chuck RPM rating or the safe limits of your workpiece. Excessive spindle speeds greatly increase the risk of the workpiece or chuck being thrown from the machine with deadly force!**

This lathe ships with the 3-jaw chuck installed. This is a scroll-type chuck where all three jaws move in unison when the chuck key is used.

The included 4-jaw chuck features independent jaws, which are used for square or unevenly-shaped stock, and to mount work that needs to be adjusted to near zero total indicated runoff.

The included faceplate has slots for T-bolts that hold standard or custom clamping hardware. With the correct clamping hardware, a faceplate offers a wide range of uses, including machining non-concentric workpieces, straight turning between centers, off-center turning, and boring.

The included drive plate has drive pins, which are used in conjunction with a straight lathe dog for turning workpieces between centers.

Refer to **Camlock Stud Installation** for installing camlock studs on the chucks, faceplate, and drive plate.

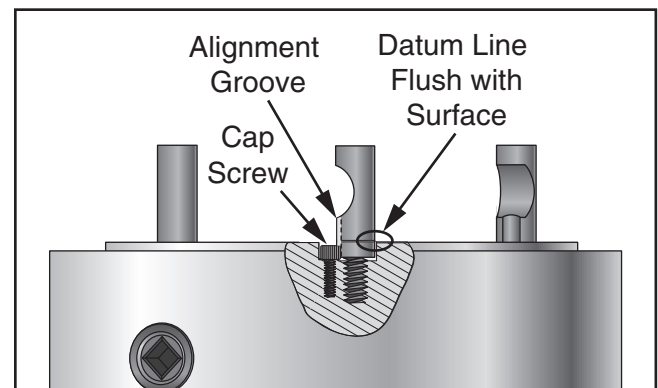
# Camlock Stud Installation

This section provides information about how to install and adjust the camlock studs so the chuck, faceplate, and drive plate properly mount to the spindle.

**Note:** *You can skip this section if the camlock studs are already installed.*

## **To install the camlock studs:**

1. Lightly oil the threads of each stud.
2. Thread the studs in until the datum line is flush with or just above the surface, and the alignment groove is positioned over the hole.



**Figure 31.** Camlock stud installation.

3. Install a cap screw in the hole next to each stud. These cap screws prevent the studs from rotating so they properly engage with the camlock during installation.

**Note:** *It is normal for studs to have a small amount of play or looseness after installing and tightening the cap screws.*

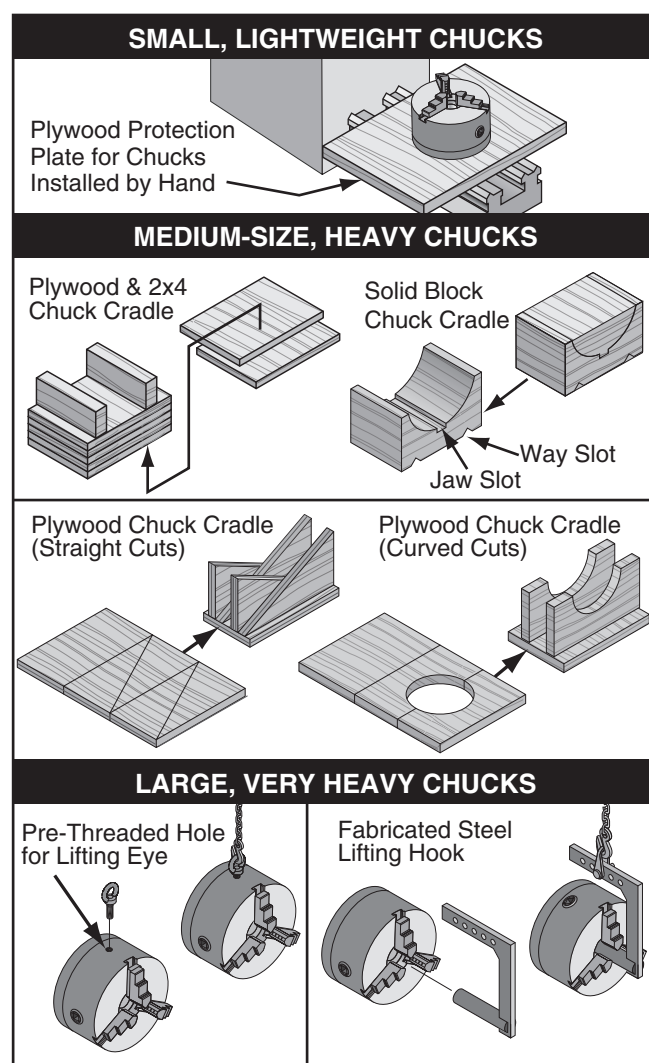


# Installation & Removal Devices

Because chucks are heavy and often awkward to hold, some kind of lifting, support, or protective device should be used during installation or removal. The weight and size of the chuck will determine the appropriate device to use (refer to the following figure for examples).

## ! WARNING

Dropping a chuck can result in amputation, serious crushing injuries, or property damage. Always use a support or protective device to reduce this risk during installation or removal.



**Figure 32.** Examples of common devices used during chuck installation and removal.

# Chuck Installation

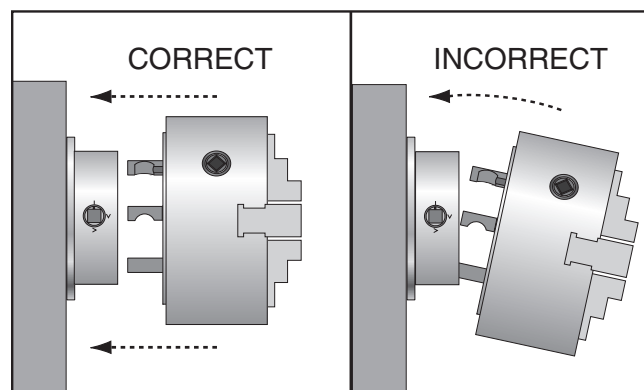
To ensure accurate work, it is extremely important to make sure the spindle nose and chuck mating surfaces/tapers are clean. Even a small amount of lint or debris can affect accuracy.

The chuck is properly installed when all camlocks are tight, the spindle and chuck tapers firmly lock together, and the back of the chuck is firmly seated against the face of the spindle all the way around—without any gaps.

## To install the chuck:

1. DISCONNECT LATHE FROM POWER!
2. Use an appropriate lifting, support, or protective device to protect the ways and support the chuck during the installation process (refer to the **Installation & Removal Devices** section on the previous page).
3. Clean and lightly oil the camlock studs, then thoroughly clean the mating surfaces of the spindle and chuck.
4. Install the chuck by inserting the camlock studs straight into the spindle cam holes.

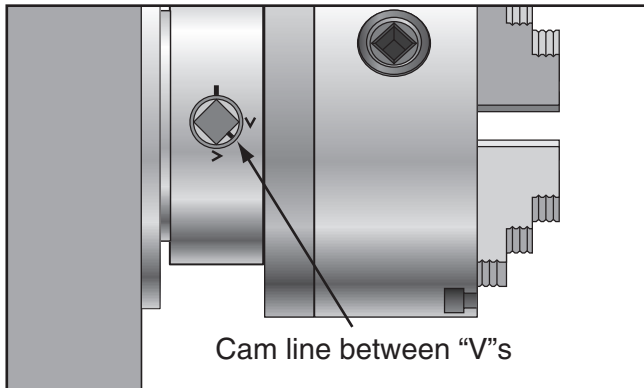
**Important:** Avoid inserting the studs by pivoting them in from an angle or rotating the spindle. This can damage studs or spindle cam holes.



**Figure 33.** Inserting camlock studs into spindle cam holes.

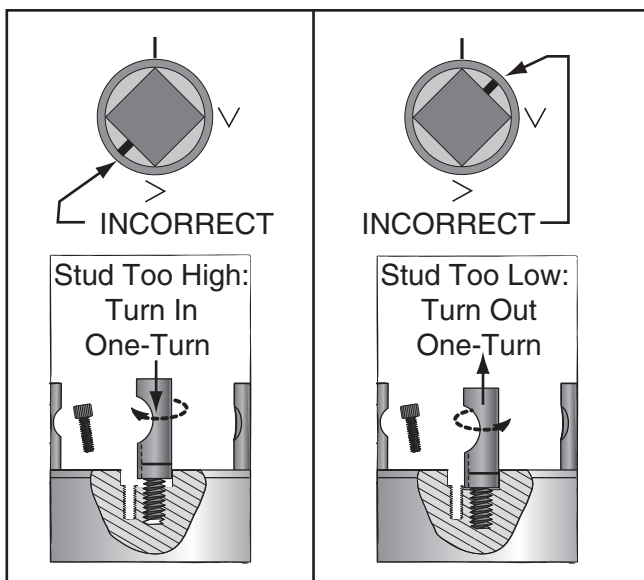


5. Incrementally tighten the camlocks in a criss-cross or star pattern to ensure that the chuck seats evenly against the spindle.
6. When the chuck is fully seated and all the camlocks are tight, verify that the cam line is between the two "V" marks on the spindle nose, as shown in the following figure.



**Figure 34.** Cam line positioned between the "V" marks after the camlocks are fully tightened.

- If the cam line is NOT between the "V" marks when the camlock is tight, the stud may be installed at the incorrect height. To fix this, adjust the stud height as shown in the following figure. Make sure to re-install the stud cap screw afterward.
- If adjusting the stud height does not correct the problem, try swapping stud positions on the chuck.



**Figure 35.** Correcting an improperly installed stud.

7. Verify that the chuck fits the spindle properly by checking for any gaps between the mating surfaces.

—If there is not a gap, proceed to **Step 8**.

—If there is a gap, remove the chuck, re-clean the mating surfaces carefully, and re-install. If the problem persists, contact our Tech Support.

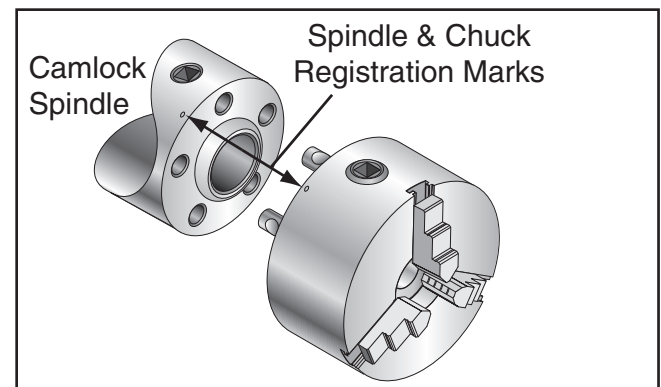
8. Verify that the chuck/spindle tapers are seated firmly together by removing the chuck, per the **Chuck Removal** instructions, and pay close attention to how easily the tapers release.

—If it was necessary to bump the chuck or use a mallet to release the tapers, then they are seating together properly.

—If the tapers released easily with little intervention, they are not seated together firmly as required. Remove the chuck, re-clean the mating surfaces carefully, and re-install. If the problem persists, contact our Tech Support.

## Registration Marks

Lightly stamp registration marks across the mating seams of chuck components. These marks will help you re-install the chuck in the same position after removal, which ensures consistent chuck balance and turning results, and allows the same camlocks and studs to operate together for consistent locking and unlocking.



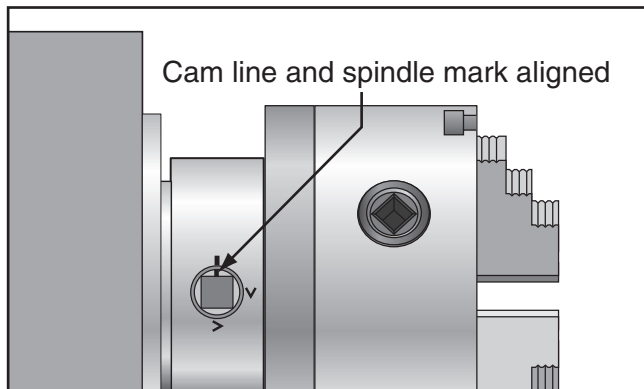
**Figure 36.** Registration mark locations.



# Chuck Removal

## To remove the chuck:

1. DISCONNECT LATHE FROM POWER!
2. Use an appropriate lifting, support, or protective device to protect the ways and support the chuck (refer to **Installation & Removal Devices** section for more details).
3. Loosen the camlocks by turning the key counterclockwise until each cam line is aligned with its corresponding spindle mark, as shown below.



**Figure 37.** Camlock is fully loosened when the cam line is aligned with the spindle mark.

**Tip:** Camlocks can become very tight. A cheater pipe may be used as a last resort to add leverage when loosening. After loosening, you may need to wiggle the chuck key in the camlock to fully disengage the stud.

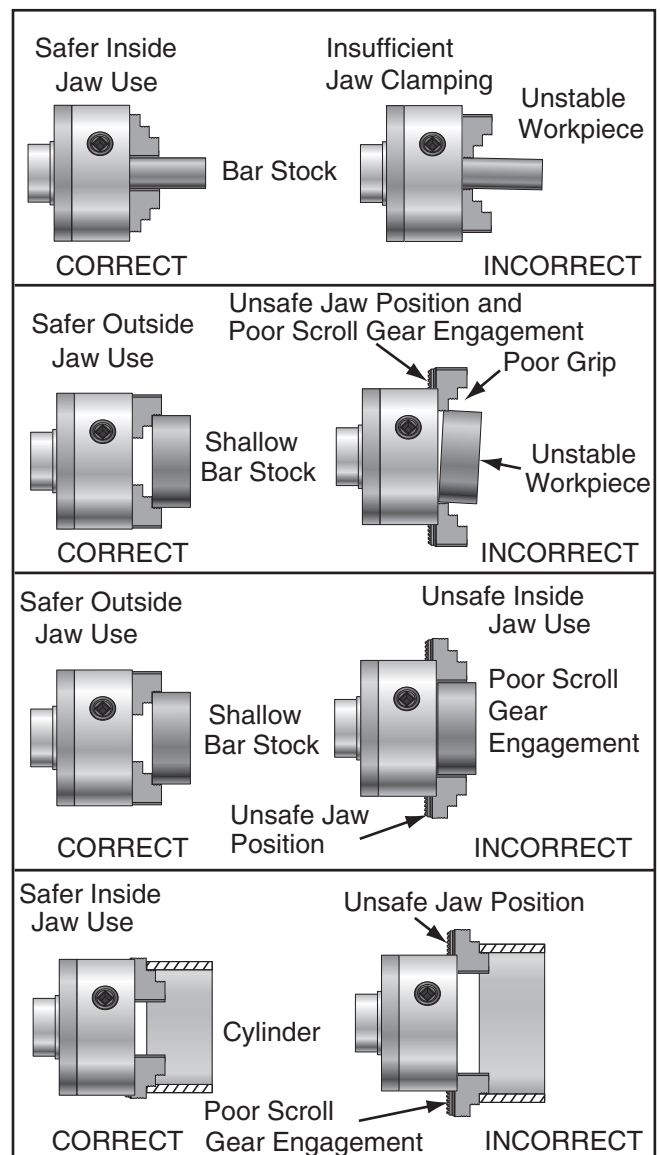
4. Using a dead blow hammer or other soft mallet, lightly tap around the outer circumference of the chuck body to loosen it from the spindle.
5. Remove the chuck from the spindle, using a light rocking motion to carefully slide the studs out of the cam holes.

—If the chuck does not immediately come off, rotate it approximately 60° and tap it again. Make sure all the marks on the cams and spindle are proper aligned for removal.

# Scroll Chuck Clamping

This 3-jaw scroll-type chuck has an internal scroll-gear that moves all jaws in unison when adjusted with the chuck key. This chuck holds cylindrical parts on-center with the axis of spindle rotation and can be rotated at high speeds if the workpiece is properly clamped and balanced.

**Never mix jaw types or positions to accommodate an odd-shaped workpiece.** The chuck will spin out of balance and may throw the workpiece! Instead, use an independent jaw chuck or a faceplate.



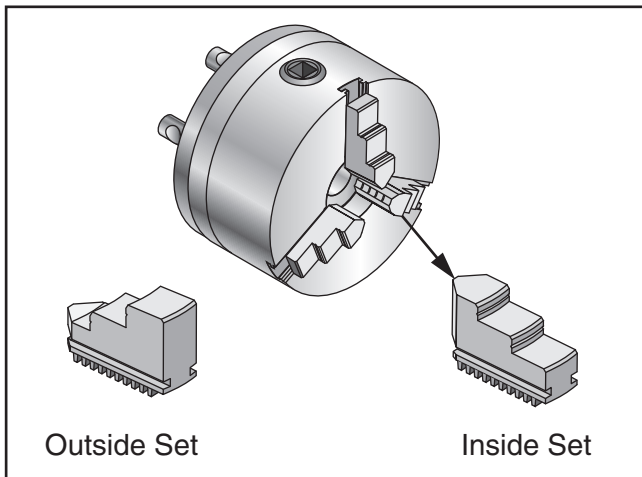
**Figure 38.** Jaw selection and workpiece holding.



# Changing Jaw Set

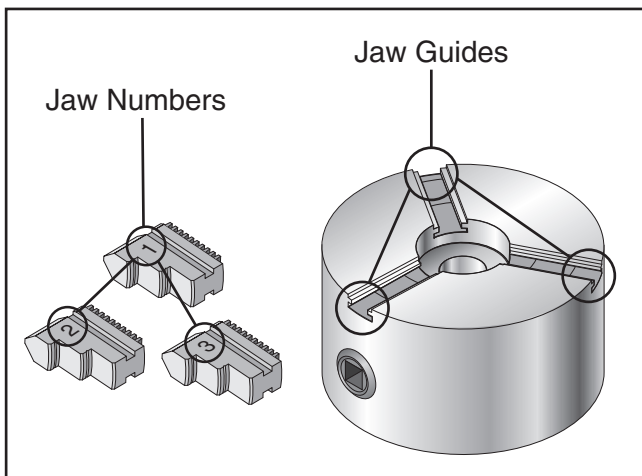
The 3-jaw scroll chuck included with the lathe features inside and outside hardened steel jaw sets (see **Figure** below), which move in unison to center a concentric workpiece.

When installing the jaws, it is important to make sure they are installed correctly. Incorrect installation will result in jaws that do not converge evenly and are unable to securely clamp a workpiece.



**Figure 39.** Chuck and jaw selection.

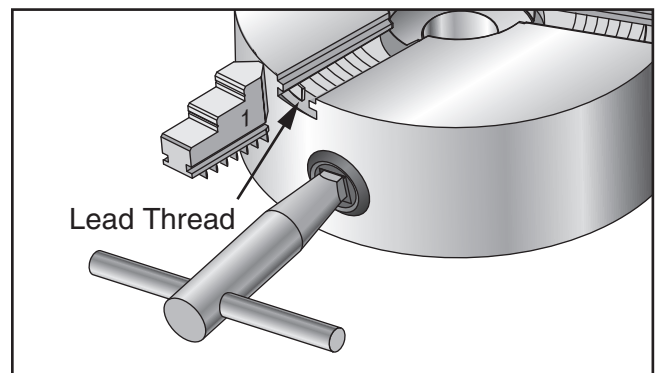
Jaws are numbered from 1–3 (see **Figure** below). The number is typically stamped on the side or bottom. Jaws are designed to be installed in numerical order in the jaw guides, so they will hold a concentric workpiece evenly.



**Figure 40.** Jaw guide and jaw numbers.

## To change the jaw set:

1. DISCONNECT LATHE FROM POWER!
2. Place a piece of plywood over the bedways to protect them from potential damage.
3. Insert the chuck key and turn it counterclockwise to back the jaws out and remove them.
4. Use mineral spirits to clean the debris and grime from the jaws and chuck jaw guides.
5. Apply a thin coat of white lithium grease to surfaces of removed jaw set. Store in a safe place free from moisture and abrasives.
6. Rotate chuck key clockwise until you see the tip of the scroll-gear lead thread begin to enter a jaw guide (see **Figure 38**).



**Figure 41.** Lead thread on scroll gear.

7. Insert jaw #1 into the jaw guide and hold the jaw against the scroll-gear.
  8. Rotate the chuck key clockwise one turn to engage the tip of the scroll-gear lead thread into the jaw. Pull the jaw; it should be locked into the jaw guide.
  9. Install the remaining jaws in numerical order, in the same manner.
- If installed correctly, the jaws will converge evenly at the center of the chuck.
- If the jaws do not converge evenly, remove them. Re-install the jaws sequentially 1–3, and make sure each one engages with the scroll-gear lead thread during its first rotation.





# 4-Jaw Chuck

Refer to the **Chuck Installation** or **Chuck Removal** sections for instructions on installing or removing the 4-jaw chuck.

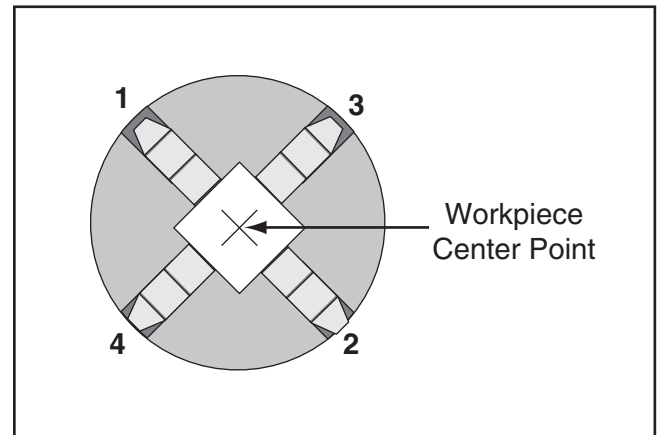
The 4-jaw chuck features independently adjustable jaws for holding non-concentric or off-center workpieces. Each jaw can be independently removed from the chuck body and reversed for a wide range of work holding versatility.

## WARNING

Because of the dynamic forces involved in machining a non-concentric or off-center workpiece, always use a low spindle speed to reduce risk of the workpiece coming loose and being thrown from the lathe, which could cause death or serious personal injury.

## Mounting Workpiece

1. DISCONNECT LATHE FROM POWER!
2. Place a chuck cradle or plywood on the bed-way below the chuck to protect the bedway surfaces.
3. Use the chuck key to open each jaw so the workpiece will lay flat against the chuck face, jaw steps, or into the spindle opening.
4. With help from another person or a holding device, position the workpiece so it is centered in the chuck.
5. Tighten each jaw in small increments. After you have adjusted the first jaw, continue tightening the remaining jaws in an opposing sequence, as shown by the sequential order in the **Figure** below.
6. After the workpiece is held in place by the jaws, use a dial indicator to make sure the workpiece is centered in the chuck.
  - If the workpiece is not correctly centered, make fine adjustments by slightly loosening one jaw and tightening the opposing jaw until the workpiece is correctly positioned (see below for an example).



**Figure 42.** 4-jaw tightening sequence.



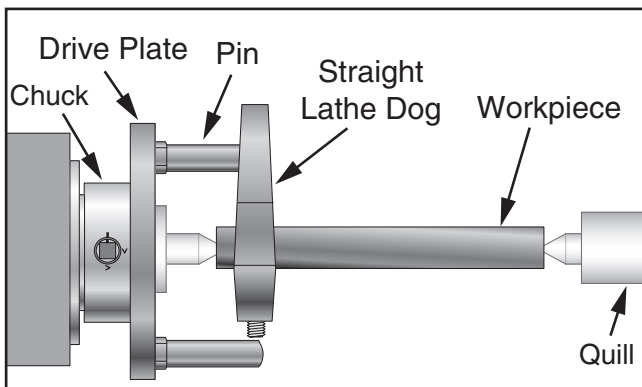
**Figure 43.** Generic picture of non-cylindrical workpiece correctly mounted on the 4-jaw chuck.



# Drive Plate

Refer to the prior **Chuck Installation and Chuck Removal** sections for instructions on installing or removing the drive plate.

The drive plate included with your lathe is used for straight turning between centers. The **Figure** below shows a straight lathe dog (not included) attached to the workpiece. The end of the dog rests against a drive plate pin.



**Figure 44.** Typical drive plate setup.

# Faceplate

Refer to the prior **Chuck Installation and Chuck Removal** sections for instructions on installing or removing the faceplate.

The faceplate included with your lathe can be used for a wide range of operations, including machining non-concentric workpieces, straight turning between centers, off-center turning, and boring.

The tools needed for mounting a workpiece will vary depending on the type of setup you have.

## **!WARNING**

**Machining non-concentric workpieces at high speeds could cause the workpiece to be thrown from the lathe with deadly force. To reduce this risk, do not exceed 395 RPM, and use counter-weights to balance the faceplate or workpiece.**

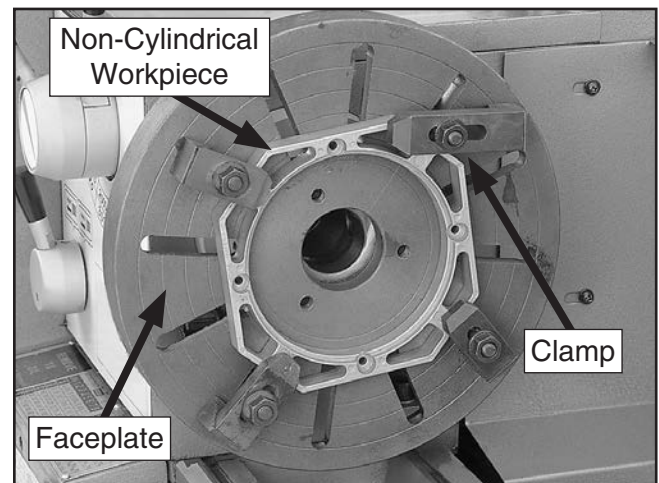
## **!WARNING**

**Failure to properly secure a workpiece to the faceplate could cause the workpiece to be thrown from the lathe with deadly force. To reduce this risk, use a minimum of THREE independent clamping devices to hold the workpiece onto the faceplate.**

**To mount a non-concentric workpiece to the faceplate:**

1. DISCONNECT LATHE FROM POWER!
2. Protect the bedway with a piece of plywood.
3. With help from another person or a holding device to support the workpiece, position it onto the faceplate and clamp it in place with a minimum of three independent clamping devices (see **Figure** below for an example).

Be sure to take into account the rotational and cutting forces that will be applied to the workpiece when clamping it to the faceplate. If necessary, use counter-weights to balance the assembly and use a dial indicator to make sure that the workpiece is properly positioned for your operation.

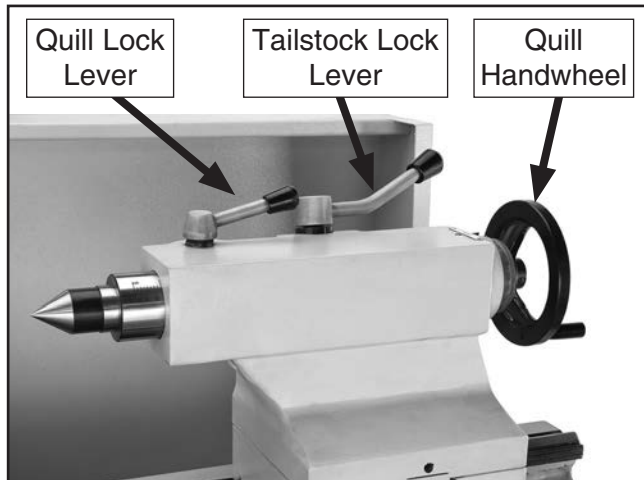


**Figure 45.** Generic picture of workpiece clamped in a faceplate.



# Tailstock

The tailstock (see **Figure** below) is typically used to support long workpieces by means of a live or dead center (refer to **Centers** in the following section). It can also be used to hold a drill or chuck to bore holes in the center of a part. Custom arbors and tapers can also be cut on your lathe by using the offset tailstock adjustment.



**Figure 46.** Tailstock and quill lock levers in locked position.

## Graduated Dial

Increments ..... 0.001"  
One Full Revolution ..... 0.200"

## Increments on Quill

Inch ..... 0"—4<sup>3</sup>/<sub>4</sub>" in <sup>1</sup>/<sub>8</sub>" Increments  
Metric ..... 0—115mm in 1mm Increments

## Positioning Tailstock

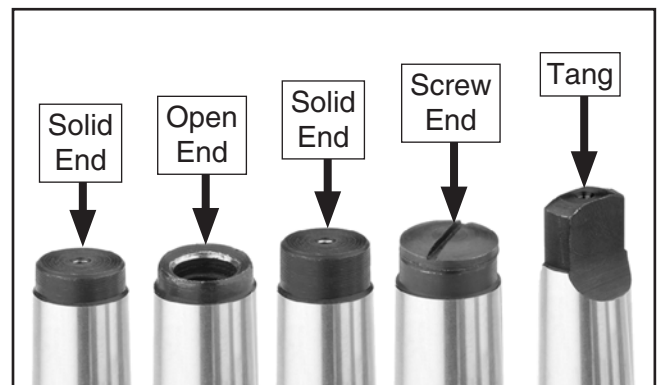
1. Pull the tailstock lock lever to unlock the tailstock from the bedway.
2. Slide the tailstock to the desired position.
3. Push the tailstock lock lever to lock the tailstock against the bedway.

## Using Quill

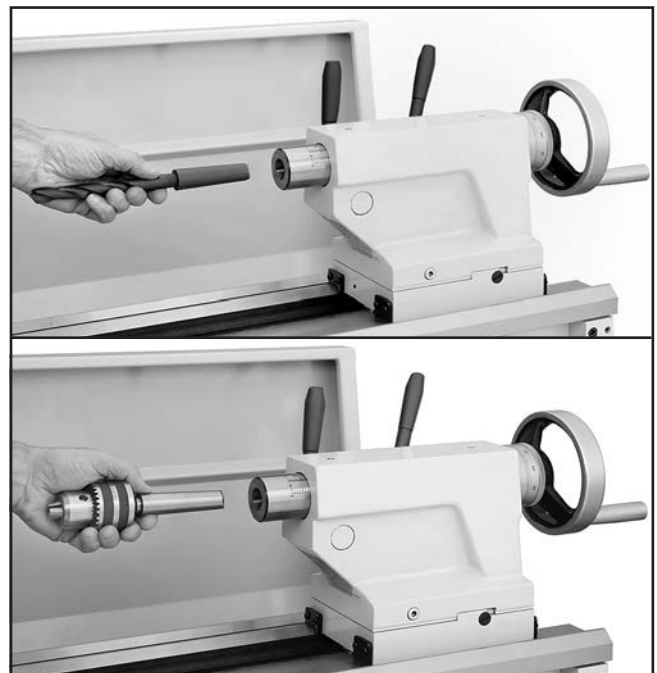
1. Move the quill lock lever away from the spindle to unlock the quill.
2. Turn the quill handwheel clockwise to move the quill toward the spindle or counterclockwise to move it away from it.
3. Move the lock lever toward the spindle to secure the quill in place.

## Installing Tooling

This tailstock uses a quill with an MT#5 taper that accepts tapered arbors and drill bits (see the **Figures** below for examples).



**Figure 47.** Types of tapered arbors and tooling.



**Figure 48.** Example photos of inserting tools into the tailstock.



**Note:** If the tooling has an open hole in the end, then a screw can be threaded into the end of the tool to provide a solid surface for the quill pin to push against when the quill is retracted for tool removal. Otherwise, removal of such tooling may be difficult.

### To install tooling in the tailstock:

1. With the tailstock locked in place, unlock the quill, then use the handwheel to extend it approximately 1".
2. Thoroughly clean and dry the tapered mating surfaces of the quill and the center, making sure that no lint or oil remains on the tapers.
3. With a firm and quick motion, insert the tool into the quill. Check to see if it is firmly seated by attempting to twist it—a firmly seated tool will not twist.
4. Unlock the tailstock and move it until the tip of the tool is close to, but not touching, the workpiece, then re-lock the tailstock.
5. Start spindle rotation, unlock the quill lock lever, then turn the quill handwheel clockwise to feed the tool into the workpiece.

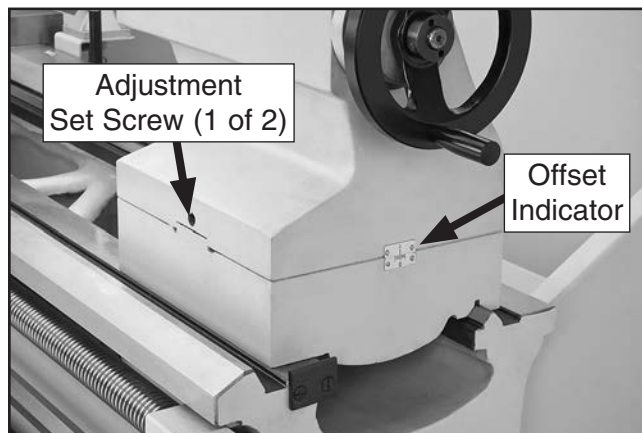
## Removing Tooling

1. Use a shop rag to hold the tool.
2. Rotate the quill handwheel counterclockwise until the tool is forced out of the quill.

## Offsetting Tailstock

The tailstock can be offset from the spindle centerline for turning tapers. Move the tailstock top casting toward the front of the lathe to machine a taper at the tailstock end. Conversely, move the tailstock top casting toward the back of the lathe to machine a taper at the spindle end.

**Note:** The marks on the offset indicator (see **Figure 49**) are arbitrary. For a precise offset, use a dial indicator to check quill movement while adjusting the screws.



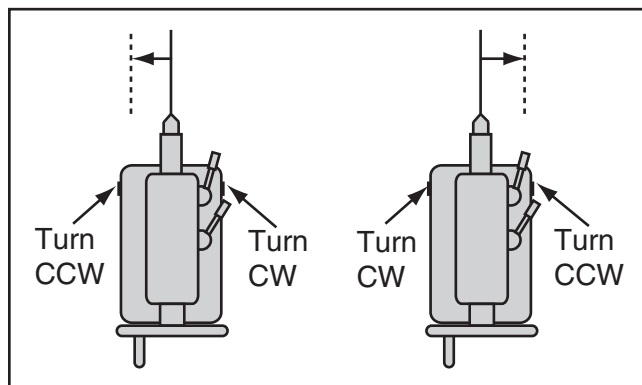
**Figure 49.** Left offset adjustment.

### Tools Needed

	Qty
Hex Wrench 6mm.....	1

### To offset the tailstock:

1. Loosen the tailstock lock lever to release the clamping pressure between the top and bottom castings.
2. Rotate the adjustment set screws in opposite directions for the desired offset (see the illustration in **Figure 50**).



**Figure 50.** Example of set screw adjustment in relation to tailstock movement.

3. Re-tighten the tailstock lock lever to secure the offset.



## Aligning Tailstock to Spindle Centerline

This is an essential adjustment that should be verified or performed each time the tailstock is used to turn concentric workpieces between centers or immediately after offsetting the tailstock when turning a taper. If the tailstock is not aligned with the spindle centerline when it is supposed to be, turning results will be inaccurate along the length of the workpiece.

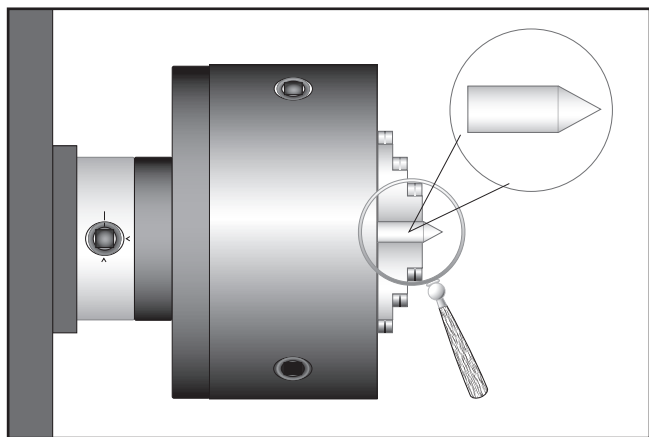
Items Needed	Qty
Hex Wrench 6mm.....	1
Round Stock 2" x 6" .....	2
Precision Level .....	1

### To align the tailstock to the spindle centerline:

1. Use the precision level to make sure the bedway is level from side to side and from front to back.

—If the bedway is not level, correct this condition before continuing with this procedure (refer to the **Leveling** section in this manual).

2. Center drill both ends of one piece of round stock, then set it aside for use in **Step 5**.
3. Use the other piece of round stock to make a dead center, and turn it to a 60° point, as illustrated in the **Figure** below.



**Figure 51.** Turning a dead center.

**Note:** As long as this dead center remains in the chuck, the point of the center will remain true to the spindle centerline. The point will have to be refinished whenever the center is removed and then returned to the chuck.

4. Install a center in the tailstock.
5. Attach a lathe dog to the test stock from **Step 2**, then mount it between the centers as shown in the **Figure** below.



**Figure 52.** Example photo of stock mounted between the centers.

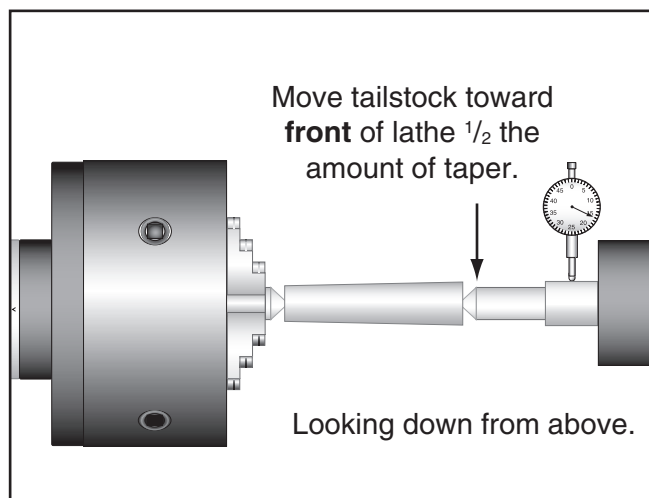
6. Turn 0.010" off the stock diameter.
7. Mount a test or dial indicator so that the plunger is on the tailstock quill.

**Note:** If necessary in the following step, refer to the **Offsetting Tailstock** subsection for detailed instructions.



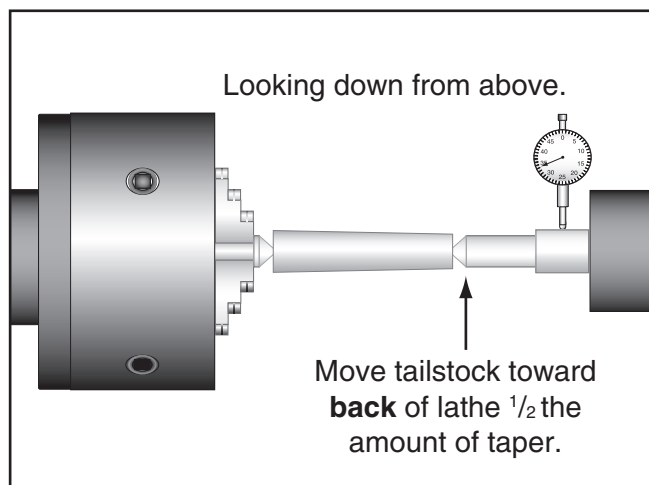
8. Use calipers to measure both ends of the workpiece.

—If the test stock is *thicker* at the tailstock end, move the tailstock toward the *front* of the lathe  $\frac{1}{2}$  the distance of the amount of taper, as shown in the **Figure** below.



**Figure 53.** Adjust tailstock toward the operator.

—If the test stock is *thinner* at the tailstock end, move the tailstock toward the *back* of the lathe  $\frac{1}{2}$  the distance of the amount of taper, as shown in the **Figure** below.

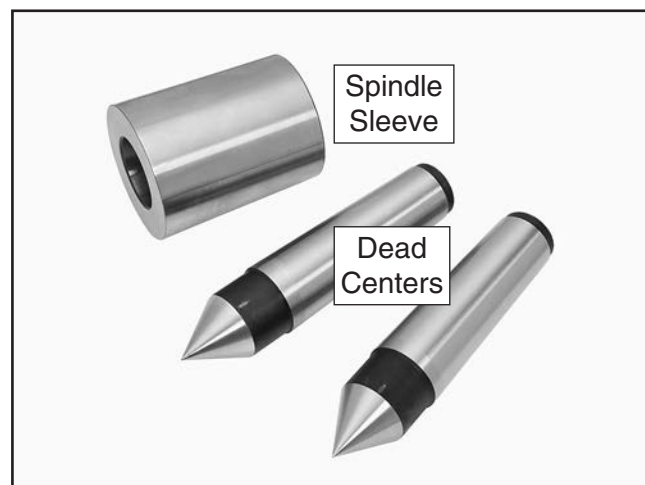


**Figure 54.** Adjust tailstock away from the operator.

9. Repeat **Steps 6–8** until the desired accuracy is achieved.

## Centers

**Figure 55** shows the MT#5 dead centers included with the lathe. In addition, an MT#7–MT#5 tapered spindle sleeve is included for mounting in the spindle.



**Figure 55.** Adapter sleeve and dead centers.

### Dead Centers

A dead center is a one-piece center that does not rotate with the workpiece and is used to support long, slender workpieces in the tailstock.

A carbide-tipped dead center (not included) can better withstand the effects of friction than a typical dead center and is best used in the tailstock where the workpiece will rotate against it. The tip of a dead center must be generously lubricated during the operation to avoid premature wear and maximize smooth operation. Using low spindle speeds will also reduce the heat and wear from friction.

Use the dead center in the spindle for operations where the workpiece rotates with the center and does not generate friction.





## Live Centers

A live center (not included) has bearings that allow the center tip and the workpiece to rotate together; it can be installed in the tailstock quill for higher speeds.

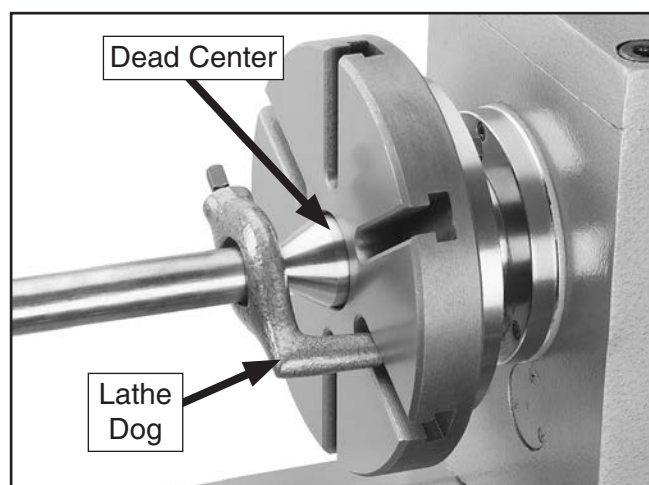
## Mounting Dead Center in Spindle

1. DISCONNECT LATHE FROM POWER!
2. Thoroughly clean and dry all threads and mating surfaces of the spindle bore and the center, making sure that no lint or oil remains on these surfaces.

**Note:** *This will prevent the tapered surfaces from seizing due to operational pressures, which could make it very difficult to remove the center.*

3. Mount the chuck, faceplate, or drive plate onto the spindle, whichever is correct for your operation.
4. Insert the center into the spindle bore through the chuck, faceplate, or drive plate.

The **Figure** below shows an example photo of a dead center installed in the spindle, using a lathe dog and faceplate for turning between centers.



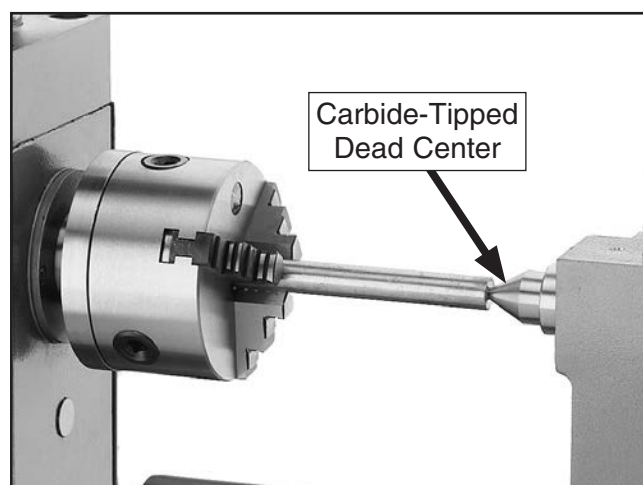
**Figure 56.** Example photo of using a dead center with a faceplate and lathe dog.

## Removing Center from Spindle

To remove the sleeve and center from the spindle, insert a piece of round bar stock (or similar) through the outside end of the spindle. Have another person hold onto the sleeve and center with a gloved hand or shop rag, then tap the bar stock to knock the sleeve loose.

## Mounting Center in Tailstock

Either a carbide-tipped dead center or live center can be used in the tailstock. Mounting instructions are the same for both. The **Figure** below shows an example photo of a dead center mounted in a tailstock.



**Figure 57.** Example photo of using a carbide-tipped dead center installed in the tailstock.

## NOTICE

To avoid premature wear of the dead center or damage to the workpiece, use low spindle speeds and keep the tip of the dead center mounted in the tailstock well lubricated.

### To mount a center in the tailstock:

1. DISCONNECT LATHE FROM POWER!
2. Thoroughly clean and dry the tapered mating surfaces of the tailstock quill bore and the center, making sure that no lint or oil remains on the tapers.





3. Use the quill handwheel to feed the quill out from the casting approximately 1".

**Note:** *The maximum quill travel is 4<sup>3</sup>/<sub>4</sub>", but we do not recommend extending the quill more than 2" or stability and accuracy will be reduced.*

4. Insert the center into the tailstock quill.
5. Seat the center firmly into the quill during workpiece installation by rotating the quill handwheel clockwise to apply pressure with the center engaged in the center hole in the workpiece.

**Note:** *Only apply enough pressure with the tailstock quill to securely mount the workpiece between centers. Avoid overtightening the center against the workpiece, or it may become difficult to remove later, and it will result in excessive friction and heat, which may damage the workpiece and center.*

## Removing Center from Tailstock

To remove the center from the quill, hold onto it with a gloved hand or shop rag, then rotate the quill handwheel counterclockwise to draw the quill back into the casting until the center releases.

## Mounting Workpiece Between Centers

1. DISCONNECT LATHE FROM POWER!
2. Drill center holes in both ends of the workpiece.
3. Install a dead center in the spindle with a lathe dog and a chuck, faceplate or drive plate, then install a live center or carbide-tipped dead center in the tailstock.
4. Lubricate the workpiece center holes, then mount it between the centers and hold it in place with light pressure from the tailstock center.
5. Seat the center firmly into the quill by rotating the quill handwheel clockwise to apply pressure against the workpiece (see example in **Figure** below).



**Figure 58.** Example photo of a workpiece mounted between the centers.

**Note:** *Only apply enough pressure to securely mount the workpiece between centers. Avoid over-tightening the center against the workpiece, or it may become difficult to remove later. Also, over-tightening will result in excessive friction and heat, which may damage the workpiece or center.*



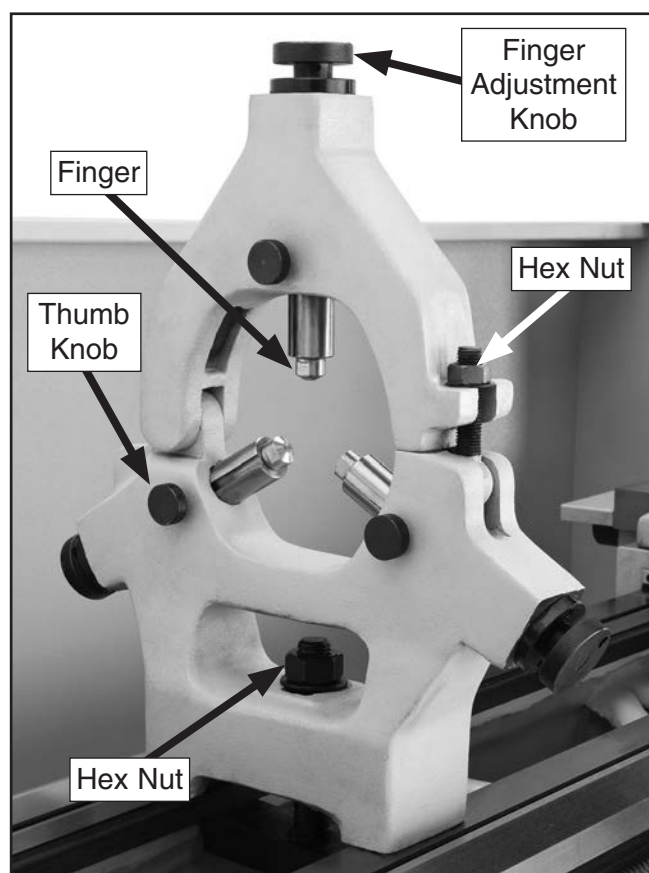
# Steady Rest

The steady rest supports long shafts and can be mounted anywhere along the length of the bedway.

Familiarize yourself with the steady rest components shown below to better understand the controls.

## Tools Needed

	Qty
Open-End Wrench 24mm.....	1
Open-End Wrench 36mm .....	1

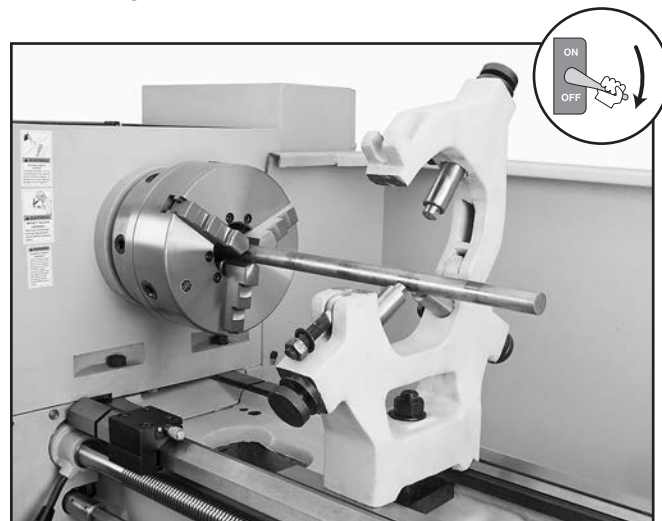


**Figure 59.** Steady rest components.

## To install and use the steady rest:

1. DISCONNECT LATHE FROM POWER!
2. Thoroughly clean all mating surfaces, then place the steady rest base on the bedways so the triangular notch fits over the bedway prism.

3. Position the steady rest with the base clamp where required to properly support the workpiece, then tighten the bottom hex nut shown in **Figure 59** to secure it in place.
4. Loosen the hex nut that secures the top half of the steady rest and open the top, as shown in **Figure 60**.



**Figure 60.** Workpiece mounted in the steady rest.

5. Loosen the three thumb knobs so the finger positions can be adjusted.
6. Use the finger adjustment knobs to position the bottom two fingers so they barely touch the workpiece, as shown in **Figure 60**.
7. Close the steady rest, then use the finger adjustment knobs to adjust all the finger tips so they just touch the workpiece without causing deflection.

**Note:** The finger tips should properly support the workpiece along the spindle centerline while still allowing it to freely rotate.

8. Tighten the thumb knobs to secure the settings.

**Note:** To reduce the effects of friction, lubricate the fingers with anti-seize lubricant during operation.

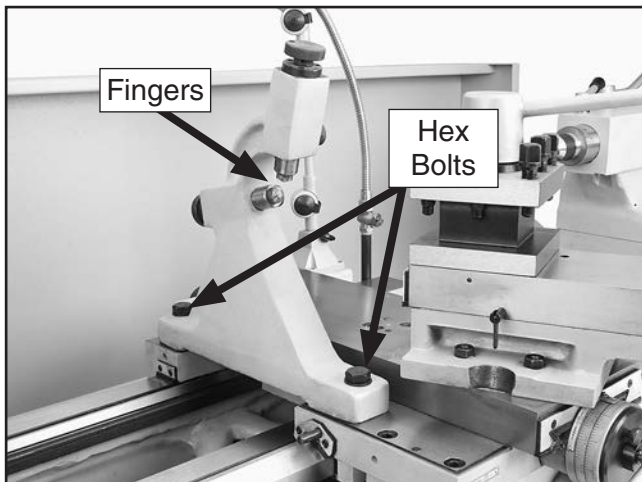


# Follow Rest

The follow rest mounts to the saddle with two hex bolts (see **Figure 61**). It is used on long, slender parts to prevent workpiece deflection from the pressure of the cutting tool during operation. Adjust the follow rest fingers in the same manner as the those on the steady rest.

**Note:** To reduce the effects of friction, lubricate the finger tips with generous anti-sieze lubricant during operation.

Tools Needed	Qty
Open-End Wrench 24mm.....	1



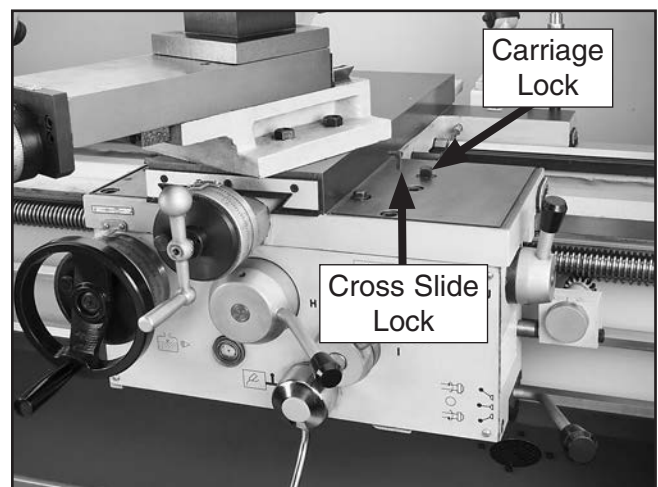
**Figure 61.** Follow rest attachment.

# Carriage & Slide Locks

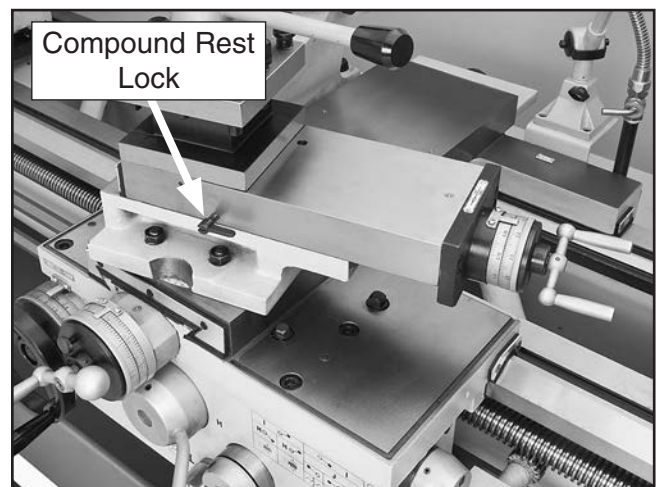
The carriage, cross slide, and compound rest have locks that can be tightened to provide additional rigidity during operation, especially during heavy cuts.

See **Figures 62–63** to identify the locations of the locks for each device.

Tools Needed	Qty
Open-End Wrench 13mm.....	1



**Figure 62.** Location of carriage and cross slide locks.



**Figure 63.** Location of compound rest lock.



# Compound Rest

The compound rest handwheel has an indirect-read graduated scale. This means that the distance shown on the scale represents the actual distance the cutting tool moves. The base of the compound rest has another graduated scale used for setting the cutting tool to a specific angle.

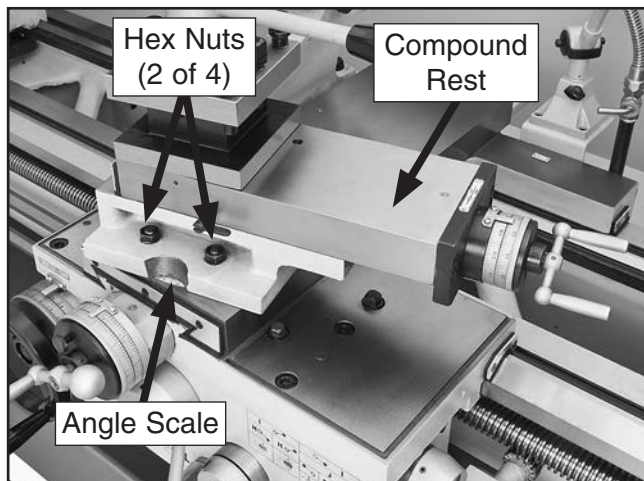
## Graduated Dial

Increments.....0.002" (0.05mm)  
One Full Revolution.....0.200" (5mm)

Tool Needed	Qty
Wrench 19mm .....	1

## To set the compound rest at a certain angle:

1. Loosen the four hex nuts at the base of the compound rest (see **Figure 64**).



**Figure 64.** Compound rest angle adjustments.

2. Rotate the rest to the desired angle, as indicated by the scale at the base, then retighten the four hex nuts.

**Tip:** The first time you set the angle of the compound rest for cutting threads, mark the location on the cross slide as a quick reference point. This will allow you to quickly return the compound rest to that exact angle the next time you need to cut threads.

# Four-Way Tool Post

The four-way tool post is mounted on top of the compound rest and allows a maximum of four tools to be loaded simultaneously.

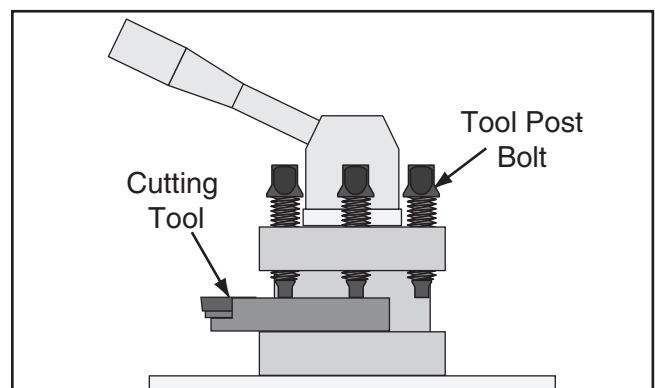
Each tool can be quickly indexed to the workpiece by loosening the top handle, rotating the tool post to the desired position, then re-tightening the handle to lock the tool into position.

## Installing Tool

Tool Needed	Qty
Tool Post T-Wrench .....	1

## To install a tool in the tool post:

1. Adjust the tool post bolts so that the cutting tool can fit underneath them (see **Figure** below).



**Figure 65.** Example of tool mounted in tool post.

## ⚠ WARNING

**Over-extending a cutting tool from the post will increase the risk of tool chatter, breakage, or tool loosening during operation, which could cause metal pieces to be thrown at the operator or bystanders with great force. DO NOT extend a cutting tool more than 2.5 times the width of its cross-section (e.g.,  $2.5 \times 0.5" = 1.25"$ ).**

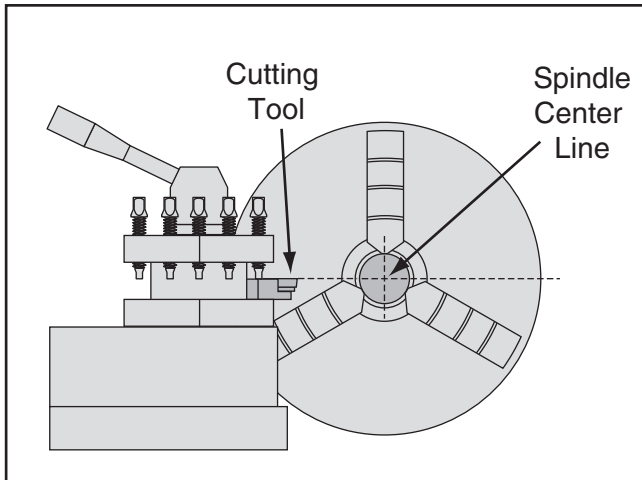
2. Firmly secure the cutting tool with at least two tool post bolts.
3. Check and adjust cutting tool to spindle centerline, as instructed in the next subsection.





## Aligning Cutting Tool with Spindle Centerline

For most operations, the cutting tool tip should be aligned with the spindle centerline, as illustrated in the **Figure** below.



**Figure 66.** Cutting tool aligned with spindle centerline (viewed from tailstock).

There are a number of ways to check and align the cutting tool to the spindle centerline. If necessary, you can raise the cutting tool by placing steel shims underneath it. The shims should be as long and as wide as the cutting tool to properly support it.

### Below are two common methods:

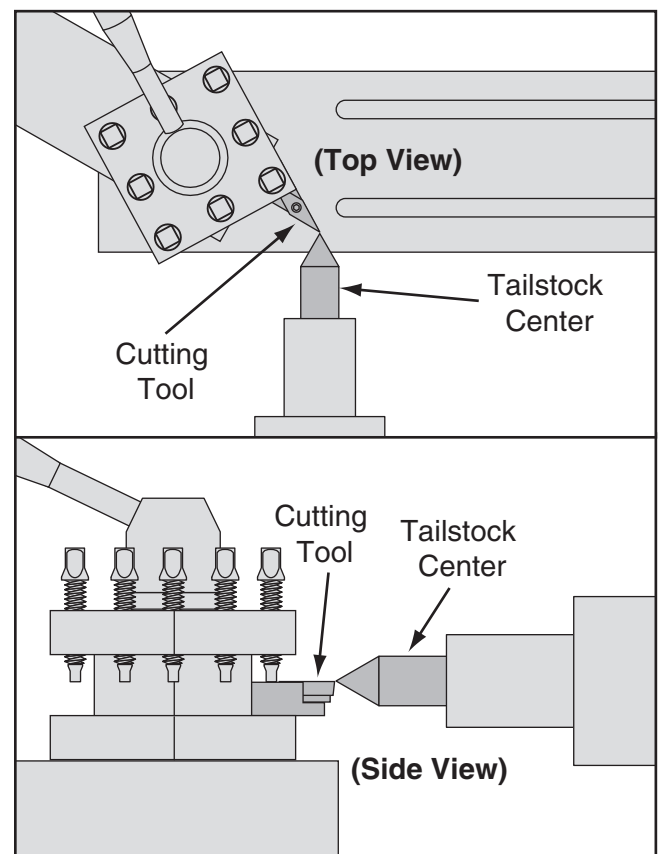
- Move the tailstock center over the cross slide and use a fine ruler to measure the distance from the surface of the cross slide to the tip of the center. Adjust the cutting tool height so it is the same distance above the cross slide as the tailstock center.
- Align the tip of the cutting tool with a tailstock center, as instructed in the following procedure. For this to work, the tailstock must be aligned to the spindle centerline (refer to **Aligning Tailstock To Spindle Centerline** in this manual for detailed instructions).

### Tools Needed

	Qty
Tool Post T-Wrench .....	1
Steel Shims .....	As Needed
Cutting Tool .....	1
Tailstock Center .....	1

### To align the cutting tool with the tailstock center:

1. Mount the cutting tool in the tool post, then secure the post so the tool faces the tailstock.
2. Install a center in the tailstock, and position the center tip near the cutting tool tip.
3. Lock the tailstock and quill in place.
4. Adjust the height of the cutting tool so that the tool tip is aligned vertically and horizontally with the center tip, as illustrated below.



**Figure 67.** Cutting tool aligned to the tailstock center.





# Micrometer Stop

Use the micrometer stop as a guide to help judge when to stop carriage movement.

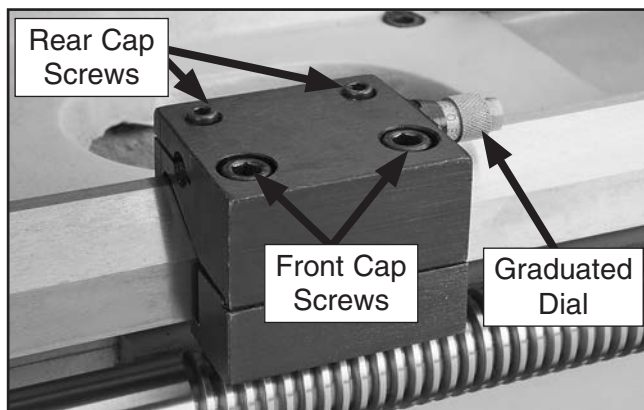
## NOTICE

The micrometer stop on this lathe will **NOT** automatically stop the carriage during threading operations when the carriage is engaged with the leadscrew! Failure to heed this notice could result in the carriage crashing and causing severe machine or property damage.

Tools Needed	Qty
Hex Wrench 5mm.....	1
Hex Wrench 8mm.....	1

### To set the micrometer stop:

1. DISCONNECT LATHE FROM POWER!
2. Use the carriage handwheel to position the carriage and cutting tool at the desired stopping point, then loosen the front cap screws on the micrometer stop (see **Figure 68**).

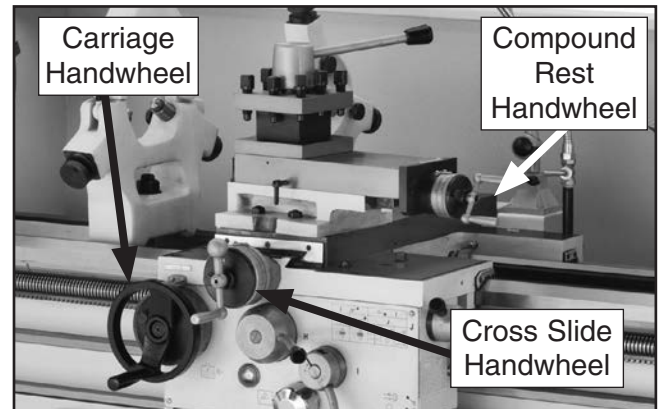


**Figure 68.** Micrometer stop.

3. Move the micrometer stop up to the carriage, loosen the rear cap screws, then adjust the graduated dial to fine-tune the position.
4. Re-tighten all the cap screws.
5. Verify that tooling will not make contact with the chuck, jaws, or other components.

# Manual Feed

The handwheels shown in **Figure 69** allow the operator to manually move the cutting tool.



**Figure 69.** Carriage Controls.

## Carriage Handwheel

The carriage handwheel moves the carriage left or right along the bed. It has a graduated dial with 0.005" increments. One full revolution moves the carriage 0.55".

## Cross Slide Handwheel

The cross slide handwheel moves the tool toward and away from the work. Adjust the position of the graduated scale by loosening the thumb knob, holding the handwheel with one hand and turning the dial with the other, then tightening the thumb knob. The cross slide handwheel has a direct-read graduated dial, which shows the total amount of material removed from the diameter of the workpiece. The dial has 0.004" (0.01mm) increments, and one full revolution moves the slide 0.200". Rotate the dial collar 180° to read in metric units.

## Compound Rest Handwheel

The compound rest handwheel moves the cutting tool linearly along the set angle of the compound rest. Adjust the position of the graduated scale in a similar manner with the handwheel and dial. The compound rest angle is set by hand-rotating it and securing in place with four hex nuts. The compound rest has an indirect-read graduated dial with 0.002" (0.05mm) increments. One full revolution of the handwheel moves the slide 0.200".



# Spindle Speed

Using the correct spindle speed is important for getting safe and satisfactory results, as well as maximizing tool life.

To set the spindle speed for your operation, you will need to: 1) Determine the best spindle speed for the cutting task, and 2) configure the lathe controls to produce the required spindle speed.

## Determining Spindle Speed

Many variables affect the optimum spindle speed to use for any given operation, but the two most important are the recommended cutting speed for the workpiece material and the diameter of the workpiece, as noted in the formula shown in **Figure 70**.

$$\frac{\text{*Recommended Cutting Speed (FPM)} \times 12}{\text{Dia. of Cut (in inches)} \times 3.14} = \text{Spindle Speed (RPM)}$$

\*Double if using carbide cutting tool

**Figure 70.** Spindle speed formula for lathes.

Cutting speed, typically defined in feet per minute (FPM), is the speed at which the edge of a tool moves across the material surface.

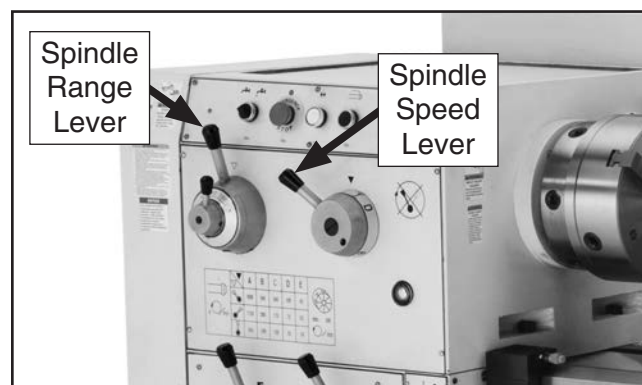
A recommended cutting speed is an ideal speed for cutting a type of material in order to produce the desired finish and optimize tool life.

The books **Machinery's Handbook** or **Machine Shop Practice**, and some internet sites, provide excellent recommendations for which cutting speeds to use when calculating the spindle speed. These sources also provide a wealth of additional information about the variables that affect cutting speed and they are a good educational resource.

Also, there are a large number of easy-to-use spindle speed calculators that can be found on the internet. These sources will help you take into account the applicable variables in order to determine the best spindle speed for the operation.

## Setting Spindle Speed

The spindle range lever and spindle speed lever, shown in **Figure 71**, are used to select one of the 15 spindle speeds.



**Figure 71.** Spindle range and speed levers.

The spindle speed and range levers control the gear configuration in the headstock to produce the selected spindle speed.

## NOTICE

**To avoid damaging gears, ALWAYS make sure the spindle is completely stopped BEFORE moving the spindle speed levers.**

The chart below shows the various combinations of lever positions for achieving a desired speed.

		Spindle Speed Lever				
Spindle Range Lever	x $\frac{\circ}{\text{min}}$	Spindle Range Lever				
		A	B	C	D	E
		1600	545	240	105	45
		1150	395	175	75	33
		845	290	130	55	24

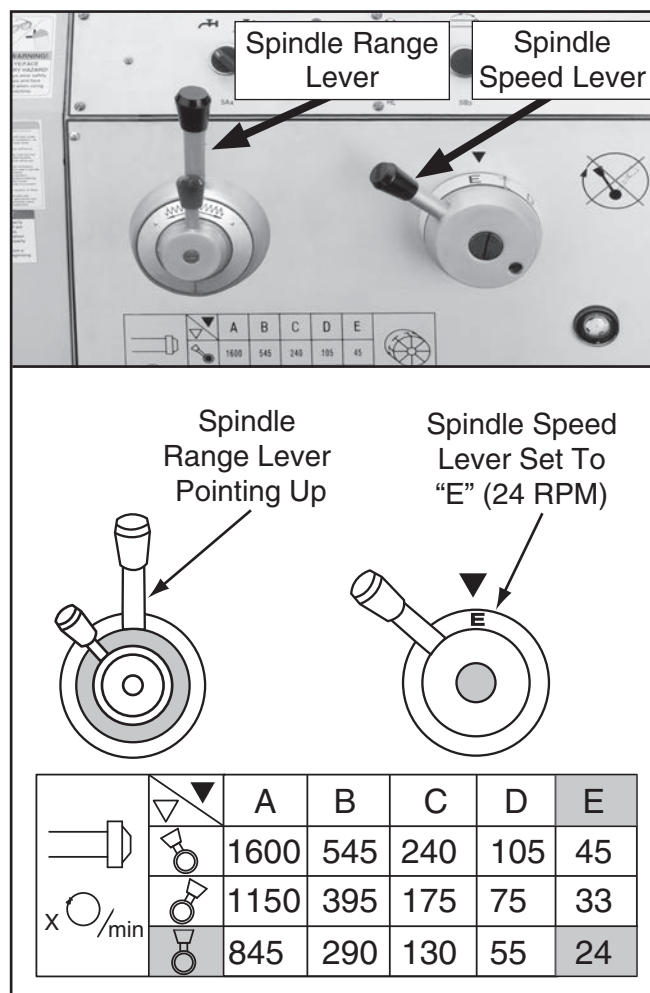
**Figure 72.** Spindle speed chart and applicable spindle lever positions.



## Configuration Example

**Figure 73** shows the levers positioned for a spindle speed of 24 RPM.

**Note:** If the spindle speed levers do not easily adjust into position, rotate the spindle by hand while you apply pressure to the lever. When the gears align, the lever will easily move into place. If you have trouble rotating the spindle by hand, you can use the spindle key or a chuck key to get additional leverage—be sure to remove the key when you are done.



**Figure 73.** Setting the spindle speed to 24 RPM.

## Power Feed

Both the carriage and cross slide have power feed capability when the carriage is engaged with the feed rod. The rate that these components move per revolution of the feed rod is controlled by the quick-change gearbox lever and dial positions and the end gear configuration.

The feed per revolution and the spindle speed must be considered together—this is the feed rate. The sources you use to determine the optimum spindle speed for an operation will also provide the optimal feed to use with that spindle speed.

Often, the experienced machinist will use the feeds and speeds given in their reference charts or web calculators as a starting point, then make minor adjustments to the feed rate (and sometimes spindle speed) to achieve the best results.

The carriage can alternately be driven by the leadscrew for threading operations. However, this section only covers the use of the power feed option for the carriage and cross slide components for non-threading operations. To learn how to power the carriage for threading operations, refer to **Threading** on **Page 57**.

### NOTICE

If the feed selection lever and the half nut are engaged at the same time, machine damage could occur. Even though there is a lock-out device to prevent this, it could break if forced.



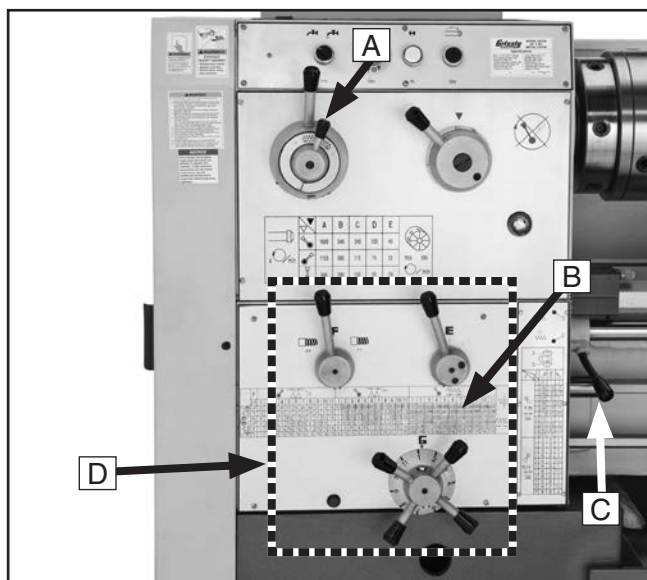
# NOTICE

To avoid damaging the lathe, **ALWAYS** make sure the spindle is completely stopped **BEFORE** using the headstock controls to make changes.

## Power Feed Controls

Use **Figures 74–75** and the following descriptions to understand the power feed controls.

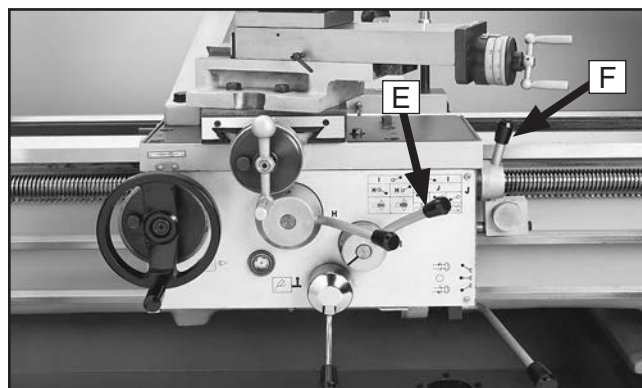
**Note:** Before using power feed, you may have to re-configure the end gears, depending on how they are set up. Refer to **End Gears** on **Page 55** for detailed instructions.



**Figure 74.** Power feed controls on the headstock.

- A. Feed Direction Lever:** Selects the direction for power feed. When the lever is positioned as shown in **Figure 74**, the carriage will move to the right along the bed, or the cross feed will travel toward the front of the lathe.
- B. Feed Rate Chart:** Displays the settings for the quick-change gearbox dial and levers for the selected feed rate. Refer to **Setting Power Feed Rate** subsection on the next page for detailed instructions.
- C. Leadscrew Feed Rod Selection Lever:** When the lever is down, enables feed rod movement, thereby allowing powered carriage movement. When lever is up, enables leadscrew for threading or pitch turning.

- D. Quick-Change Gearbox Feed Dial and Levers:** Position these as indicated on the charts to choose different feed rates for metric and inch threading or diametral and modular pitches.



**Figure 75.** Apron power feed controls.

- E. Feed Lever:** When the lever is down, enables carriage for power feed operations. When the lever is up, disables power feed and enables threading operations.
- F. Feed Selection Lever:** Changes the power feed to either the cross slide or the carriage.

When the lever is up, the cross slide is selected. When the lever is down, the carriage is selected. In the middle position neither the cross slide nor the carriage will move.

**Note:** When using this lever, you may need to slightly rotate the handwheel of the component you are trying to engage, so that the apron gears can mesh.





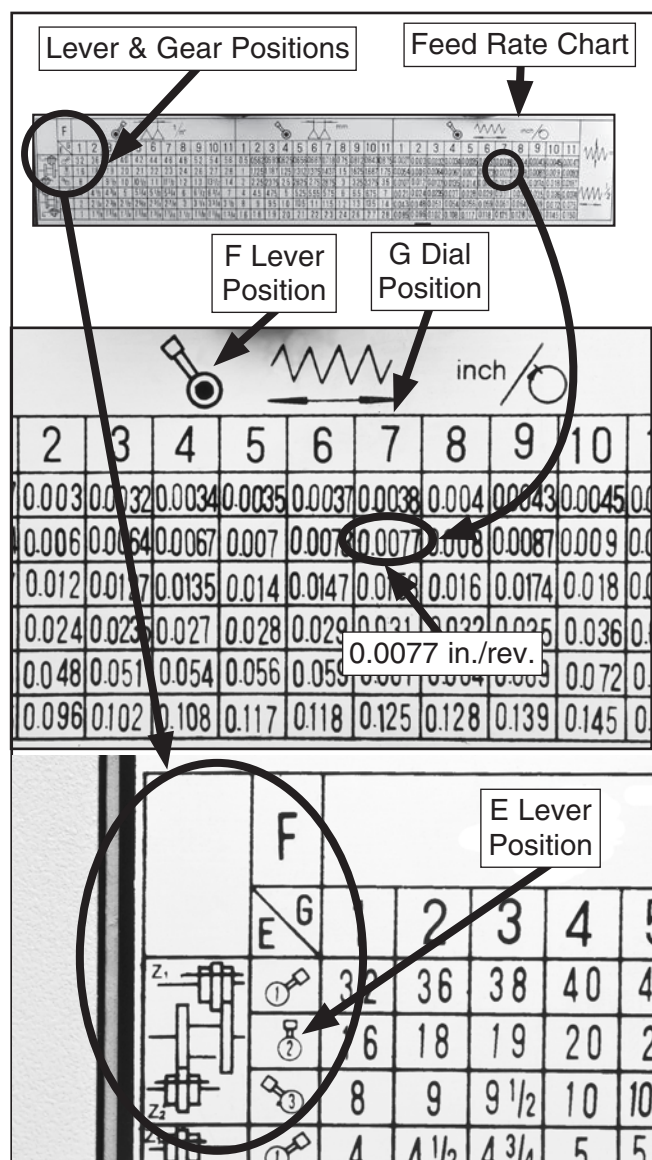
## Setting Power Feed Rate

The feed-rate chart displays the settings for the headstock feed controls for feed rates.

Using the controls on the lathe, follow along with the example below to better understand how to set the lathe for the desired power feed rate.

### Setting Power Feed Rate of 0.0077 in./rev.

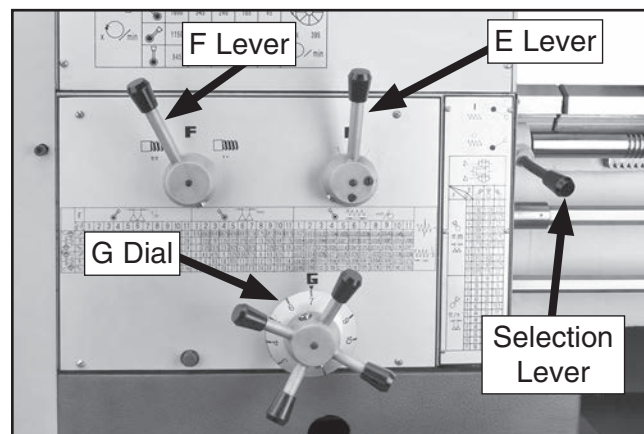
1. Locate the box on the feed rate chart that lists 0.0077 in./rev., as shown in **Figure 76**.



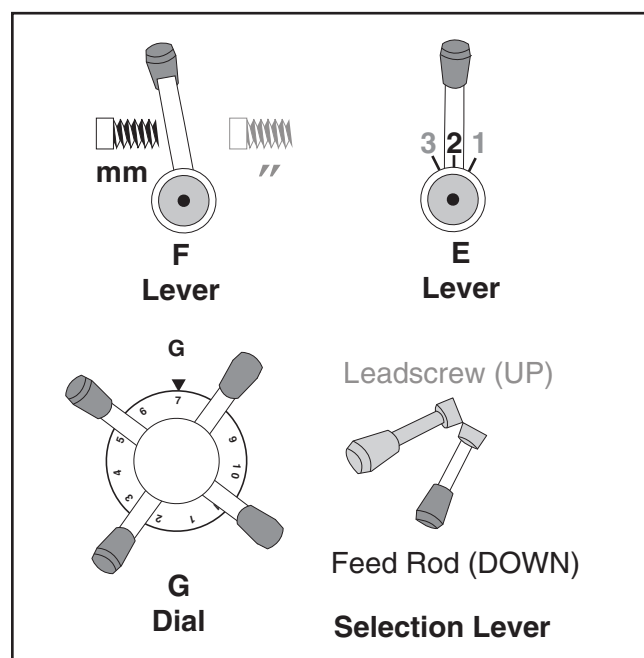
**Figure 76.** 0.0077 in./rev. location on feed chart. Lever, dial and gear positions.

2. Locate the applicable lever, dial, and gear positions on the chart.

3. Position the gears in the correct position (refer to **Power Feed Configuration** on the next page for details).
4. Position the quick change gearbox **G Dial** at **7**, **E lever** at **2**, and the **F lever** to the **left**, as shown in **Figure 77**. If necessary, rock the spindle back and forth to help mesh the gears.



**Figure 77.** Quick-change lever and dials positioned for 0.0077 in./rev.



**Figure 78.** Lever and dial settings for 0.0077 in./rev.

5. Move the leadscrew feed rod selection lever down.

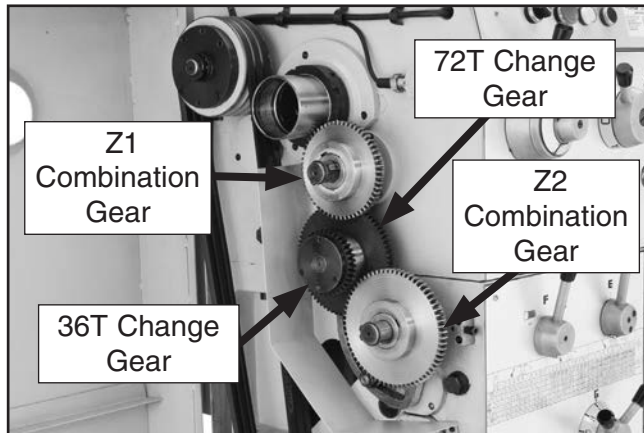
The carriage is now set up for a power feed rate of 0.0077 in./rev.





# End Gears

The end gears must be correctly setup for power feed, threading, and pitch turning. Use the photo below to identify the upper Z1 combination gear, middle 36T and 72T change gears, and lower Z2 combination gear, which are also referenced on the headstock feed, threading, and pitch turning charts.

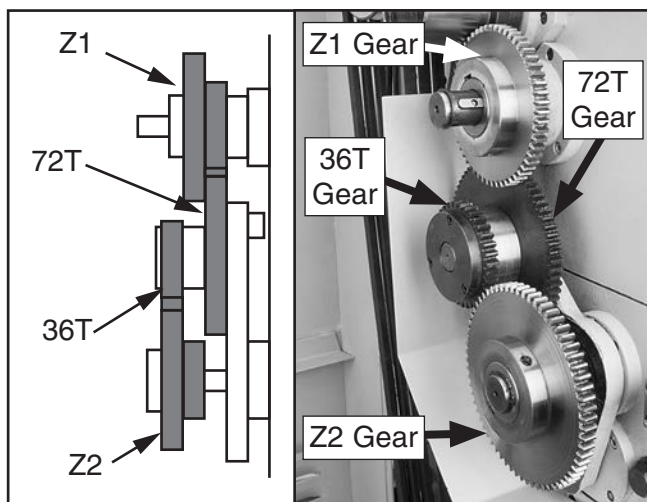


**Figure 79.** Change gear identification.

The following subsections explain how to configure the end gears, which are accessed by opening the end-gear cover on the side of the headstock.

## Primary Configuration

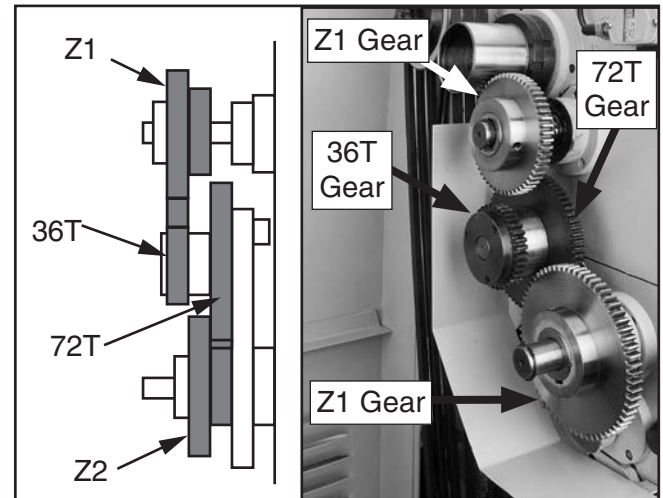
The primary configuration is used for inch and metric threading and power feeding. Mesh the small Z1 gear with the 72T gear, and mesh the large Z2 gear with the 36T gear (see **Figure 80**).



**Figure 80.** Primary change gear configuration.

## Secondary Configuration

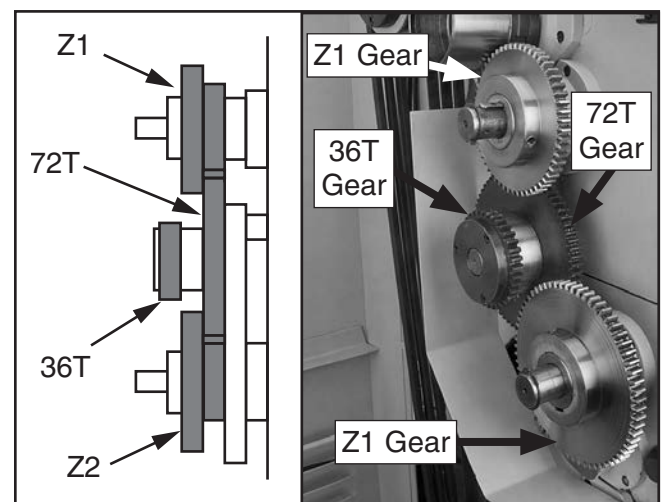
The secondary configuration is used for a different range of threads and feed rates than the primary configuration. Mesh the large Z1 gear with the 36T gear and the small Z2 gear with the 72T gear, as shown in **Figure 81**.



**Figure 81.** Secondary change gear configuration.

## Alternate Configuration

The alternate end gear configuration is used when cutting modular or diametral pitches. The small Z1 and Z2 gears are positioned so they mesh with the 72T gear, as shown in **Figure 82**.



**Figure 82.** Diametral and modular change gear configuration.



## End-Gear Configuration Example

Follow the example below to better understand how to configure the end gears for inch threading.

### Tools Needed

Qty

Hex Wrench 6mm..... 1  
Open-End Wrench or Socket 24mm ..... 1

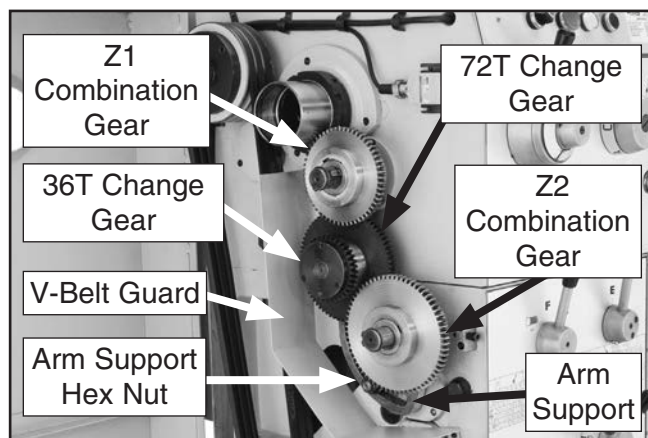
### To configure end gears for threading 16 TPI:

1. Locate **16 TPI** and the primary gear configuration on the thread chart (see **Figure 83**).

	F							
E	6	1	2	3	4	5	6	7
		32	36	38	40	42	44	46
		16	18	19	20	21	22	23
		8	9	9 1/2	10	10 1/2	11	11 1/2
		4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4

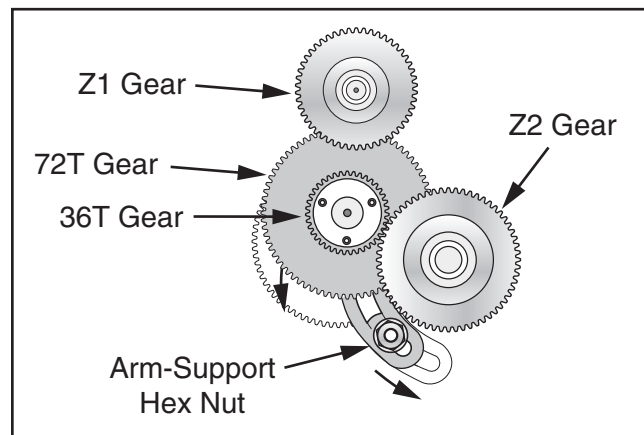
**Figure 83.** Locating change gears for 16 TPI.

2. DISCONNECT LATHE FROM POWER!
3. Remove the cap screw that secures the end-gear cover, then open it.
4. While holding the 36T and 72T change gears, loosen the arm support hex nut (see **Figure 84**).



**Figure 84.** Arm support and gear locations.

5. Slowly let the gears pivot down until they rest against the V-belt guard (see **Figure 84**).
6. Slide the Z2 gear out on its shaft so the outer Z2 gear meshes with the 36T change gear (see **Figure 85**).



**Figure 85.** End gear placement.

**Note:** Steel balls under the Z1 and Z2 gears engage with detents on the gear shafts to secure them in place.

7. Slide the Z1 gear against the headstock.
8. Rotate the 72T gear up so it meshes with the inner Z1 gear with 0.002" to 0.004" backlash.
9. Tighten the arm support hex nut.
10. Close the end-gear cover and secure it with the cap screw removed earlier.



# Threading

The following subsections will describe how to use the threading controls and charts to set up the lathe for a threading operation. If you are unfamiliar with the process of cutting threads on a lathe, we strongly recommend that you read books, review industry trade magazines, or get formal training before attempting any threading projects.

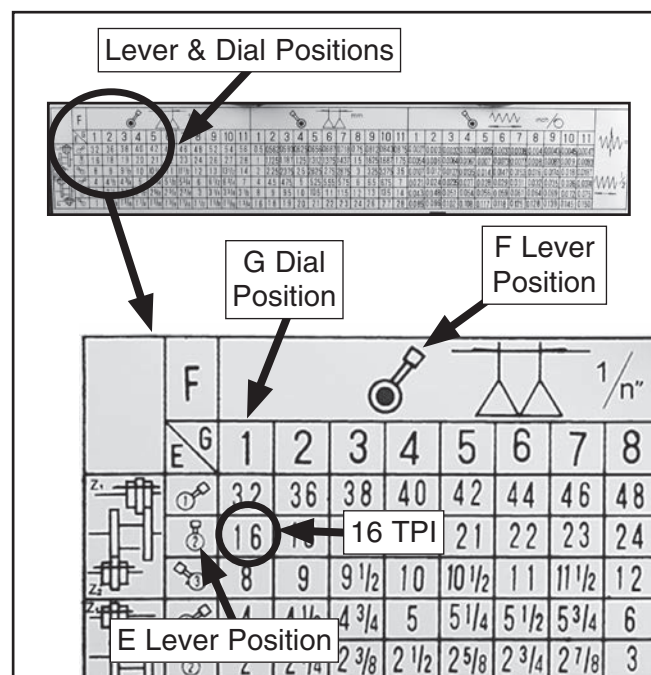
## Headstock Threading Controls

The threading charts on the headstock face display the settings for inch and metric threading.

Using the controls on the lathe, follow the example below to understand how to set up the lathe for the desired threading operation.

### To set levers and dials for 16 TPI:

1. Configure the gears, as instructed in the **End Gear Configuration Example** on **Page 56**.
2. Locate **16 TPI** on the inch threading chart shown in **Figure 86**.

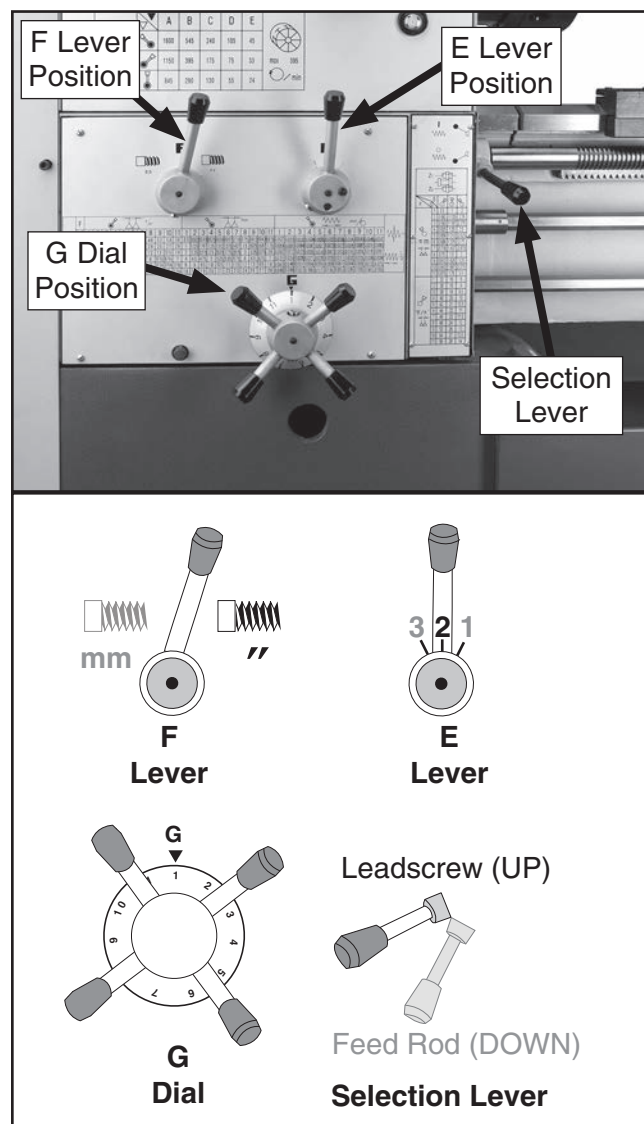


**Figure 86.** 16 TPI and corresponding lever and dial positions.

3. To the left of 16 TPI, locate the **E** lever in the **2** position. Above 16 TPI, locate the **F** lever position and the **G** dial position—which will be set to **1** (see **Figure 86**).

**Note:** In the next step, use the chuck key to rock the spindle back-and-forth to help mesh the gears as you make adjustments.

4. Position the gearbox levers and dials, as shown in **Figure 87**.



**Figure 87.** Lever and dial settings for 16TPI.

5. Move the leadscrew feed rod selection lever up.

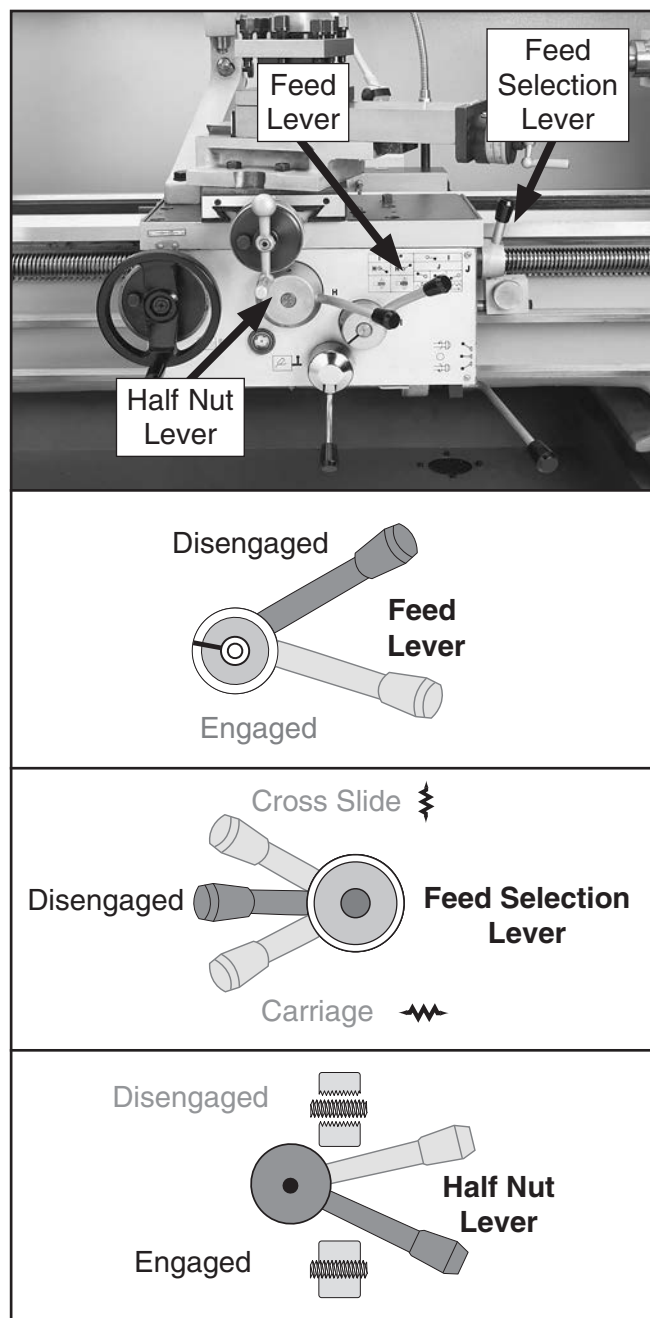
The lathe is now set up to cut 16 TPI threads.



## Apron Threading Controls

The half nut lever engages the carriage with the leadscrew, which moves the carriage and cutting tool along the length of the workpiece for threading operations (see **Figure 88**).

**Important:** Make sure the feed lever and feed selection lever are in the disengaged position before attempting to engage the half nut.



**Figure 88.** Apron threading controls.

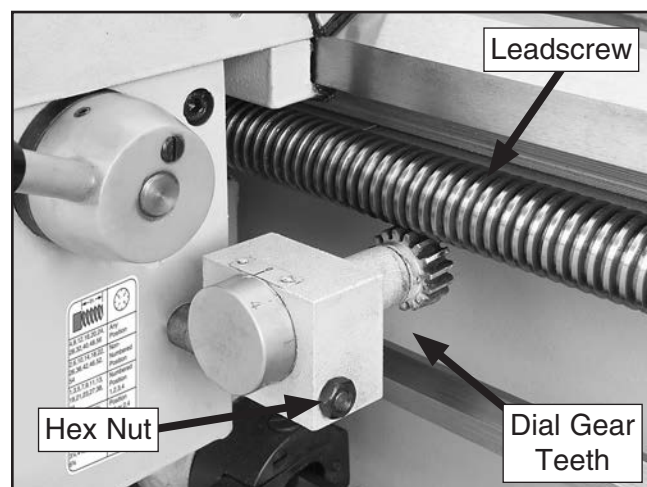
## Thread Dial

### Tools Needed

	Qty
Open-End Wrench 14mm.....	1

The numbers on the thread dial are used with the thread dial chart to show when to engage the half nut during inch threading. Loosen the hex nut on the thread dial (see **Figure 89**), pivot the gear teeth so they mesh with the leadscrew threads, then re-tighten the hex nut.

**Note:** The thread dial is not used for metric threading or pitch turning. You must leave the half nut engaged from the beginning until the turning is complete for this type of operation.



**Figure 89.** Thread dial engaged with the leadscrew.

## NOTICE

When threading, we recommend using the slowest speed possible and avoiding deep cuts, so you are able to disengage the half nut when required and prevent an apron crash!

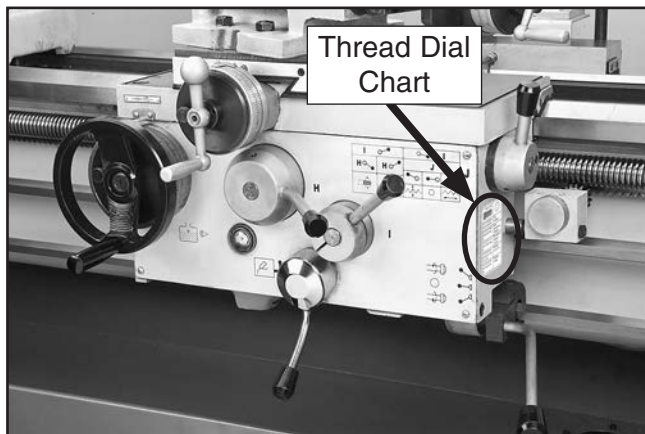
When the first thread cutting pass is complete, the operator disengages the carriage from the leadscrew using the half nut lever. The operator returns the carriage for the next pass and re-engages the half nut using the same thread dial setting to resume the cut in the previous pass.





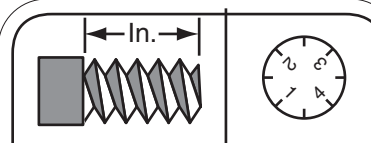
## Thread Dial Chart

The thread dial chart is located on the apron, as shown in **Figure 90**.



**Figure 90.** Thread dial chart location.

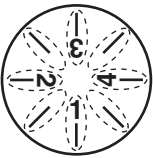
Find the TPI (threads per inch) that you want to cut in the left column on the thread dial chart (see **Figure 91**), then reference the dial number to the right. The dial numbers indicate when to engage the half nut for a specific thread pitch as indicated by the thread dial.

	
4,8,12,16,20,24, 28,32,40,48,56	Any Position
2,6,10,14,18,22, 26,36,42,46,52, 54	Non- Numbered Position
1,3,5,7,9,11,13, 19,21,23,27,38, 44	Numbered Position 1,2,3,4
1½,2½,3½,4½, 5½,6½,9½,10½, 11½,13½	Position 1,3 or 2,4
1¼,1¾,2¼,2¾, 3¼,4¾,5¼,5¾, 6¾	Position 1 Only

**Figure 91.** Thread dial chart.

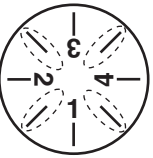
The following examples explain how to use the thread dial and the thread dial chart.

**TPI Divisible by 4:** Use any line on the thread dial (see example in **Figure 92**).

TPI	Dial Number	Thread Dial
4,8,12,16,20,24, 28,32,40,48,56	Any Position	

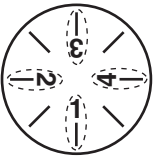
**Figure 92.** Any position on dial for threading TPI divisible by 4.

**Even TPI Divisible by 2:** Use any non-numbered line on the thread dial (see example in **Figure 93**).

TPI	Dial Number	Thread Dial
2,6,10,14,18,22, 26,36,42,46,52, 54	Non- Numbered Position	

**Figure 93.** Example of an inch thread pitch divisible by 2.

**Odd Numbered TPI & Even TPI Not Divisible by 8:** Use any of the numbered lines on the thread dial (see example in **Figure 94**).

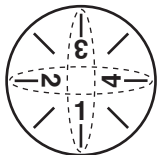
TPI	Dial Number	Thread Dial
1,3,5,7,9,11,13, 19,21,23,27,38, 44	Numbered Position 1,2,3,4	

**Figure 94.** Example of an odd numbered inch thread pitch.





**½ Fractional TPI:** Use any opposing number pairs—1/3 or 2/4 on the thread dial (see example in **Figure 95**).

TPI	Dial Number	Thread Dial
1½, 2½, 3½, 4½, 5½, 6½, 9½, 10½, 11½, 13½	Position 1, 3 or 2, 4	

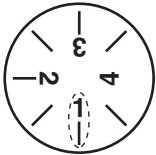
**Figure 95.** Example of opposing number groups for cutting ½ thread TPI.

**Important:** Once a number has been selected, continue using that number or its odd/even counterpart.

**For example:**

- If you use 1 during the first threading pass, then you must select 1 or 3 for all following passes.
- If you use 2 during the first threading pass, then you must select 2 or 4 for all following passes.

**¼ or ¾ Fractional TPI:** Use position 1 on the thread dial (see example in **Figure 96**).

TPI	Dial Number	Thread Dial
1¼, 1¾, 2¼, 2¾, 3¼, 4¾, 5¼, 5¾, 6¾	Position 1 Only	

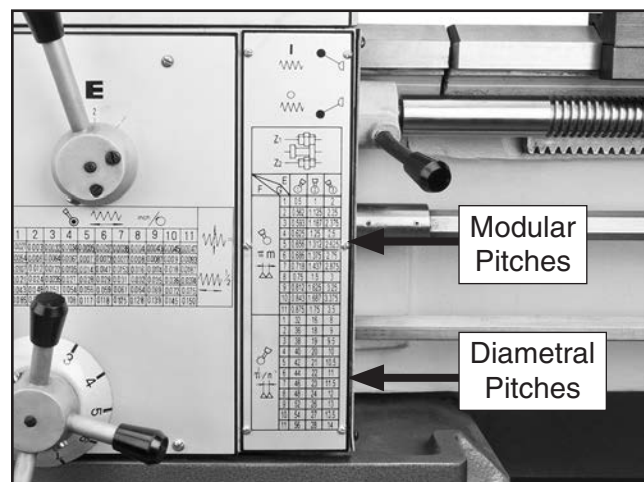
**Figure 96.** Example of ¼ or ¾ fractional TPI.

## Pitch Turning

The following subsection describes how to set up the lathe for diametral or modular pitch turning. If you are unfamiliar with the process of turning pitches on a lathe, we strongly recommend that you read books, review industry trade magazines, or get formal training before attempting specific projects.

### Headstock Pitch Turning Controls

The pitch turning charts on the headstock face display the settings for diametral and modular pitch turning, as shown in **Figure 97**.



**Figure 97.** Location of modular and diametral pitch charts.

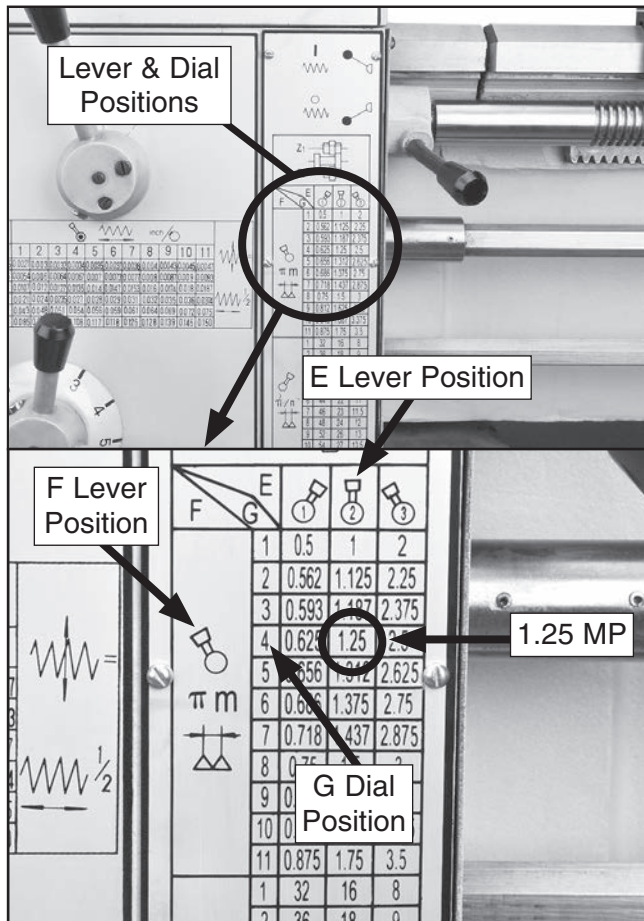
Using the controls on the lathe, follow the example below to understand how to set up the lathe for the desired pitch turning operation.

**To set levers and dials for 1.25 MP:**

1. Configure the gears as instructed in **Alternate Configuration** on **Page 55**.



2. Locate **1.25 MP** on the chart below.

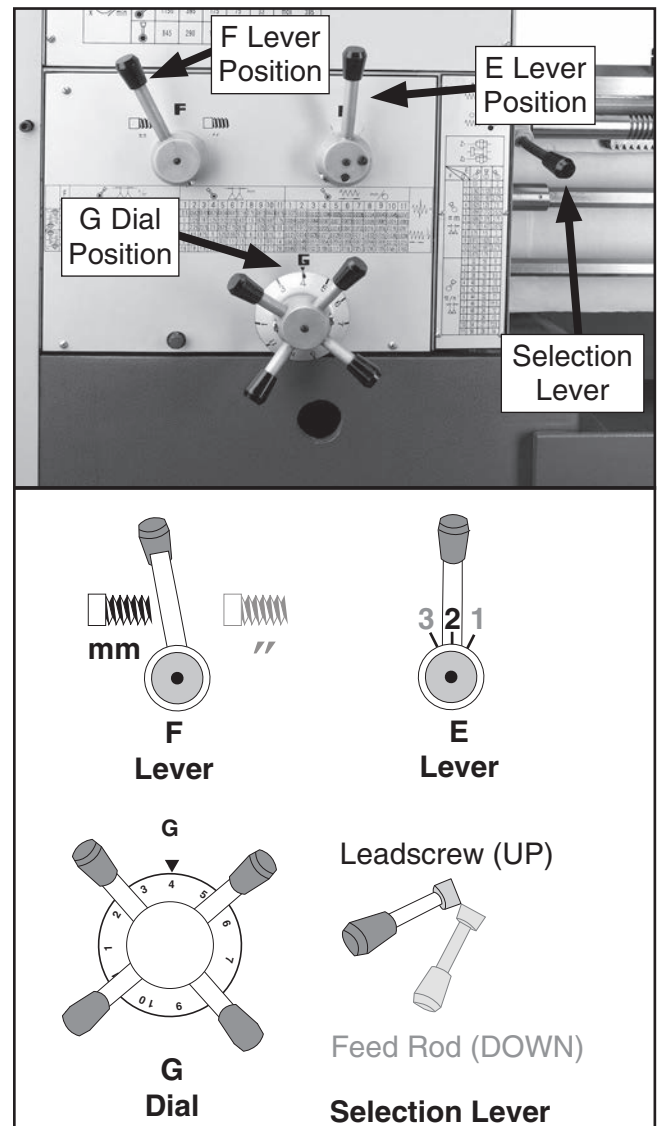


**Figure 98.** 16 TPI and corresponding lever and dial positions.

3. To the left of 1.25 MP, locate the **F** lever in the left position, and **G** dial in the **4** position. Above 1.25 MP, locate the **E** lever in the **2** position (see **Figure 98**).

**Note:** In the next step, rock the chuck back and forth so the gears will mesh together.

4. Position the gearbox levers and dials, as shown in **Figure 99**.



**Figure 99.** Lever and dial settings for 1.25 MP.

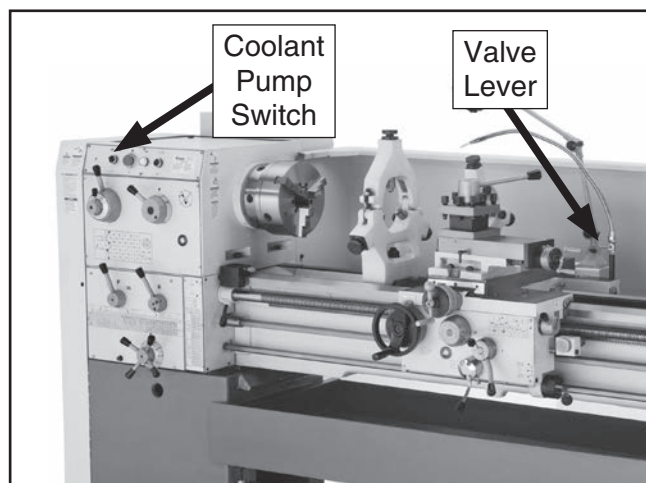
5. Move the leadscrew feed rod selection lever up.

The lathe is now set up to turn 1.25 MP.



# Coolant System

When the coolant pump is turned **ON**, fluid is delivered through the nozzle attached to the carriage. The flow is controlled by the valve lever at the base of the nozzle (see **Figure 100**).



**Figure 100.** Coolant flow controls.

Always use high quality coolant and follow the manufacturer's instructions for diluting. The quick reference table shown in **Figure 101** can help you select the appropriate fluid.

Refer to **Coolant System Service** on **Page 72** for detailed instructions on how to add or change fluid. Check the coolant regularly and promptly change it when it becomes overly dirty or rancid, or as recommended by the fluid manufacturer.

**! WARNING**  
**BIOLOGICAL & POISON HAZARD!**  
 Use the correct personal protection equipment when handling coolant. Follow federal, state, and fluid manufacturer requirements for proper disposal.

**NOTICE**

Running the pump without adequate fluid in the coolant tank may permanently damage it, which will not be covered under warranty.

## To use the coolant system on your lathe:

1. Make sure the coolant tank is properly serviced and filled with the appropriate fluid, and that you are wearing the necessary personal protection equipment.
2. Position the coolant nozzle for your operation.
3. Use the coolant pump switch on the control panel to turn the pump **ON**.
4. Adjust the flow of coolant by using the valve lever near the base of the nozzle hose.

**Important:** Promptly clean any splashed fluid from the floor to avoid a slipping hazard.

Workpiece	Dry	Water Soluble Oil	Synthetic Fluids	Sulferized Oil	Mineral Oil
Aluminum		X	X		
Brass	X	X	X		
Bronze	X	X	X		X
Cast Iron	X				
Low Carbon Steel		X	X		
Alloy Metals		X	X	X	X
Stainless Steel		X	X	X	X

**General Note:** Cutting fluids are used for heavy-duty lathe operations and production turning. Oil-water emulsions and synthetic cutting fluids are the most common for typical lathe operations. Sulferized oils often are used for threading. For small projects, spot lubrications can be done with an oil can or brush, or omitted completely.

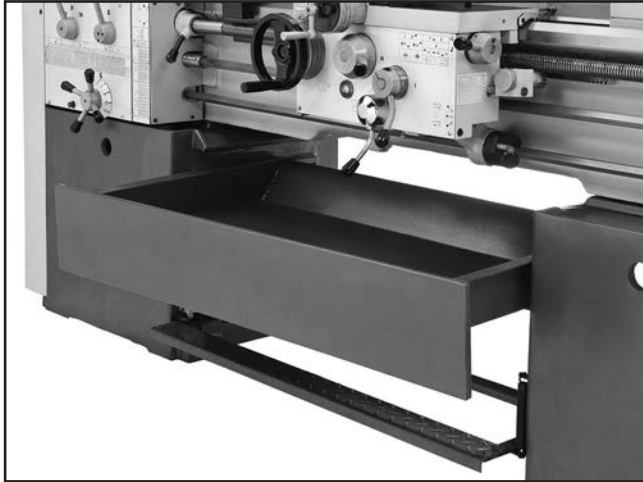
**Figure 101.** Coolant selection table.



# Chip Drawer

The chip drawer catches swarf and metal chips during the machining process. It contains a screen that keeps the large chips from returning to the reservoir with the run-off coolant—this prevents the chips from causing pump damage.

Also, it slides open and is removable for cleaning (see **Figure 102**).



**Figure 102.** Chip drawer.

## **CAUTION**

The chip drawer is very heavy. Unless removing the chip drawer for cleaning, do not pull it out more than halfway to prevent it falling and causing impact injuries. If removing the drawer for cleaning, get assistance!



# SECTION 5: ACCESSORIES

## **! WARNING**

Installing unapproved accessories may cause machine to malfunction, resulting in serious personal injury or machine damage. To reduce this risk, only install accessories recommended for this machine by Grizzly.

## **NOTICE**

Refer to our website or latest catalog for additional recommended accessories.

**T23962—ISO 68 Moly-D Way Oil, 5 gal.**

**T23963—ISO 32 Moly-D Machine Oil, 5 gal.**

Moly-D oils are some of the best we've found for maintaining the critical components of machinery because they tend to resist run-off and maintain their lubricity under a variety of conditions—as well as reduce chatter or slip. Buy in bulk and save with 5-gallon quantities.



**Figure 103.** ISO 68 and ISO 32 machine oil.

**T23964—Armor Plate with Moly-D Multi-purpose Grease, 14.5 oz.**

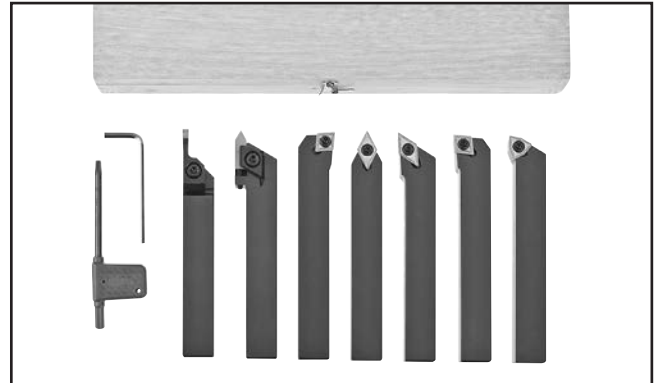
A rich green moly grease that provides excellent stability and unsurpassed performance under a wide range of temperatures and operating conditions.



**Figure 104.** T23964 Armor Plate.

**T10295—7-Pc. Indexable Carbide Set  $\frac{5}{8}$ "**

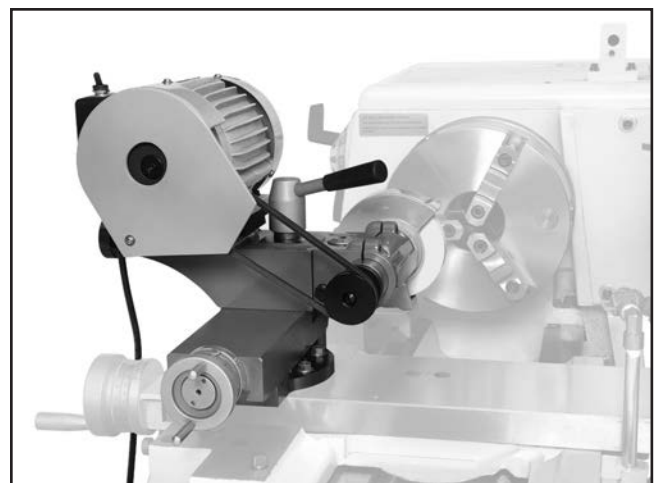
This turning tool set is ideal for a wide variety of projects. Supplied with right hand and left hand turning/facing tool holders, the set is complimented with one threading and cut-off tool too. Indexable inserts ensure cutting surfaces stay sharp.



**Figure 105.** T10295 Indexable Carbide Set.

**G0688—Tool Post Grinder**

This tool post grinder has what it takes to make your project to spec and look good, too! The heavy support casting is loaded with a precision spindle that will provide spectacular finishes on even the toughest jobs. Comes supplied with one external grinding wheel, one internal grinding wheel, and balanced mandrel pulleys and belts for each wheel.



**Figure 106.** G0688 Tool Post Grinder.

**order online at [www.grizzly.com](http://www.grizzly.com) or call 1-800-523-4777**





**G4985—Machine Shop Practice-Vol. 1 - Book**  
**G4986—Machine Shop Practice-Vol. 2 - Book**  
 Karl Hans Moltrecht's two-volume work on metal-working operations delivers the ultimate teaching and reference tool for basic cutting operations, layout work, lathe turning, drilling operations, taper and angle turning, and boring work. Written to aid the beginner as well as the experienced machinist or engineer. Due to their nature, books are non-returnable. Defective books will be replaced.



**Figure 107.** G4985 Machine Shop Practice Book.

#### **H7991—Mini Mag Base Indicator Set**

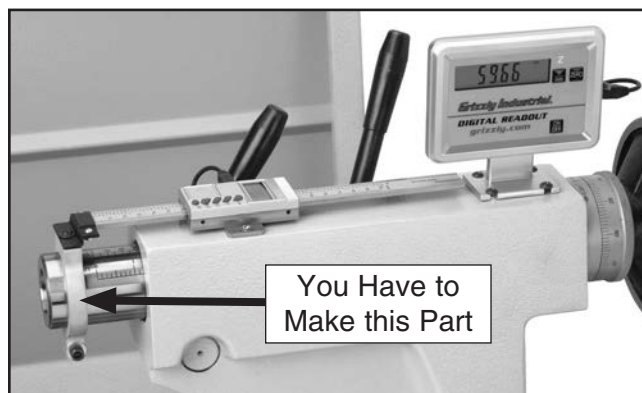
Set features a 7 Jewel indicator with 0.0005" resolution. The mini magnetic base measures 1<sup>3</sup>/<sub>16</sub>" x 1<sup>3</sup>/<sub>16</sub>" x 1<sup>3</sup>/<sub>8</sub>" and includes a single lock knob for easy set-ups. Includes 2 dovetail tool posts and a protective plastic case.



**Figure 108.** H7991 Mini Mag Base Indicator Set

#### **T10118—Tailstock Digital Readout**

Here's the slickest setup for managing the exact depth of cut with your tailstock! Both the scale display and remote display come with a 0.0005" (five ten-thousandths of an inch) resolution, inch or millimeter display, zero keys and ON/OFF keys. The scale has an 8" range and its display features ABS or INC mode as well as a Hold key. Both displays read independently of each other, too!



**Figure 109.** T10118 Tailstock Digital Readout.

#### **H6095—Digital Readout (DRO)**

This is one of the finest two-axis DRO's on the market today. Features selectable resolution down to 5µm, absolute/incremental coordinate display, arc function, radius/diameter function, master reference datum, 199 machinist defined tools, double sealed scales, inches/millimeters and linear error compensation. Don't be fooled by our low prices—this is only a reflection of the absence of any "middlemen" in the marketing structure—not a reflection of the quality.



**Figure 110.** H6095 Digital Readout.



# SECTION 6: MAINTENANCE

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## Schedule

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### Ongoing

To maintain a low risk of injury and proper machine operation, if you ever observe any of the items below, shut down the machine immediately and fix the problem before continuing operations:

- Loose mounting bolts or fasteners.
- Worn, frayed, cracked, or damaged wires.
- Guards or covers removed.
- EMERGENCY STOP button not working correctly or not requiring you to reset it before starting the machine again.
- Oil level not visible in the sight glasses.
- Damaged or malfunctioning components.

### Daily, Before Operations

- Check/add headstock oil (**Page 67**).
- Check/add gearbox oil (**Page 68**).
- Check/add apron oil (**Page 69**).
- Lubricate the bedways (**Page 69**).
- Add oil to the ball oilers (**Page 70**).
- Clean/lubricate the leadscrew (**Page 69**).
- Disengage the feed lever and feed selection lever on the apron (to prevent crashes upon startup).
- Ensure carriage lock bolt is loose.

### Daily, After Operations

- Press the EMERGENCY STOP button (to prevent accidental startup).
- Vacuum/clean all chips and swarf from bed, slides.
- Wipe down all unpainted or machined surfaces with an oiled rag.

### Every 50 Hours

- Lubricate end gears (**Page 71**).

### Every 1000 Operating Hours

- Change the headstock oil (**Page 67**).
- Change the gearbox oil (**Page 68**).
- Change the apron oil (**Page 69**).

### Annually

- Check/level bedway (**Page 27**).

## Cleaning/Protecting

---

Because of its importance, we recommend that the cleaning routine be planned into the workflow schedule.

Typically, the easiest way to clean swarf from the machine is to use a wet/dry shop vacuum that is dedicated for this purpose. The small chips left over after vacuuming can be wiped up with a slightly oiled rag. Avoid using compressed air to blow off chips, as this may drive them deeper into the moving surfaces or cause sharp chips to fly into your face or hands.

All unpainted and machined surfaces should be wiped down daily to keep them rust free and in top condition. This includes any surface that is vulnerable to rust if left unprotected (especially parts that are exposed to water soluble cutting fluid). Use a quality ISO 68 way oil (see **Page 64** for offerings from Grizzly) to prevent corrosion.



# Lubrication

Use the information in the charts below as a daily guide for lubrication tasks. We recommend using Grizzly T23962 (ISO 68) or T23963 (ISO 32) lubricants (see **Accessories, Page 64**) for most of the lubrication tasks.

## Lubrication Frequency

Lubrication Task	Frequency	Page Ref.
Headstock	Daily	<b>63</b>
Quick-Change Gearbox	Daily	<b>68</b>
Apron	Daily	<b>69</b>
Bedways	Daily	<b>69</b>
Longitudinal Leadscrew	Daily	<b>69</b>
Ball Oilers	Daily	<b>70</b>
End Gears	Every 1000 Hours	<b>71</b>

## Lubrication Amount & Type

Lubrication Task	Oil Type	Amount
Headstock	ISO 32	<b>18 Qt.</b>
Quick-Change Gearbox	ISO 68	<b>9.5 Qt.</b>
Apron	ISO 68	<b>6.5 Qt.</b>
Bedways	ISO 68	<b>As Needed</b>
Longitudinal Leadscrew	ISO 68	<b>As Needed</b>
Ball Oilers	ISO 32	<b>1-2 Squirts</b>
End Gears	NLGI #2	<b>Dab</b>

Items Needed	Qty
Wrench 13mm .....	1
Wrench 14mm .....	1
Wrench 24mm .....	1
5 Gallon Catch Pan .....	1
Pump-Type Oil Can w/Plastic Cone Tip .....	1

## NOTICE

The recommended lubrication is based on light-to-medium usage. Keeping in mind that lubrication helps to protect the value and operation of the lathe, these lubrication tasks may need to be performed more frequently than recommended here, depending on usage.

Failure to follow reasonable lubrication practices as instructed in this manual could lead to premature failure of lathe components and will void the warranty.

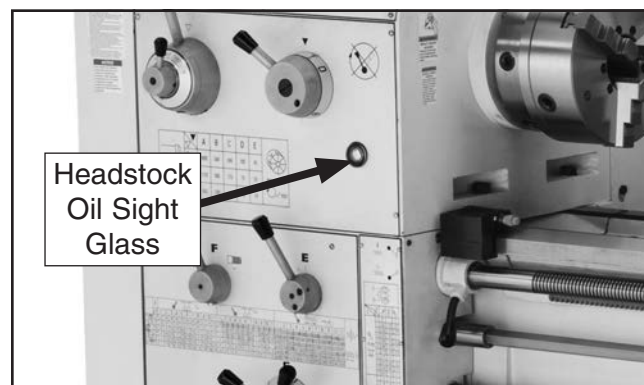
## Headstock

Oil Type .... Grizzly T23963 or ISO 32 Equivalent  
 Oil Amount..... 18 Quarts  
 Check/Add Frequency ..... Daily  
 Change ..... Every 1000 Operating Hours

The headstock gearing is lubricated by an oil bath that distributes the lubricant with the motion of the gears, much like an automotive manual transmission. Change the oil after the first 300 hours of use, then every 1000 hours.

## Checking Oil Level

The headstock reservoir has the proper amount of oil when the oil level in the sight glass is approximately halfway. The oil sight glass is located on the right side of the headstock, as shown in **Figure 111**.

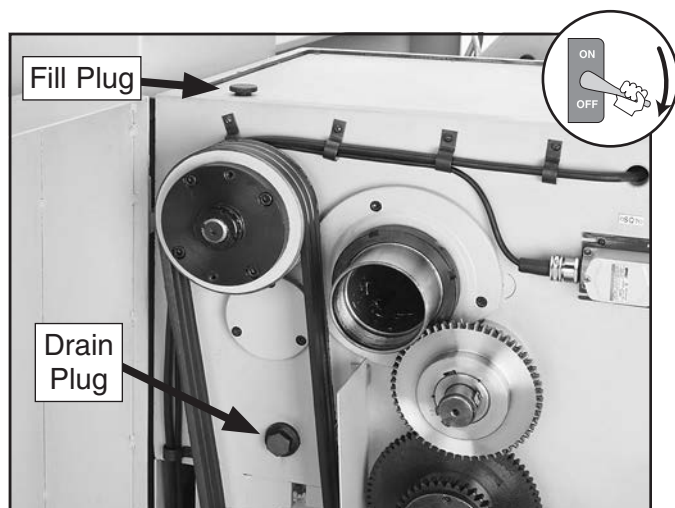


**Figure 111.** Location of headstock oil sight glass.



### Adding Oil

The oil fill plug is located on top of the headstock, as shown in **Figure 112**.



**Figure 112.** Headstock fill and drain plugs.

#### To change the headstock oil:

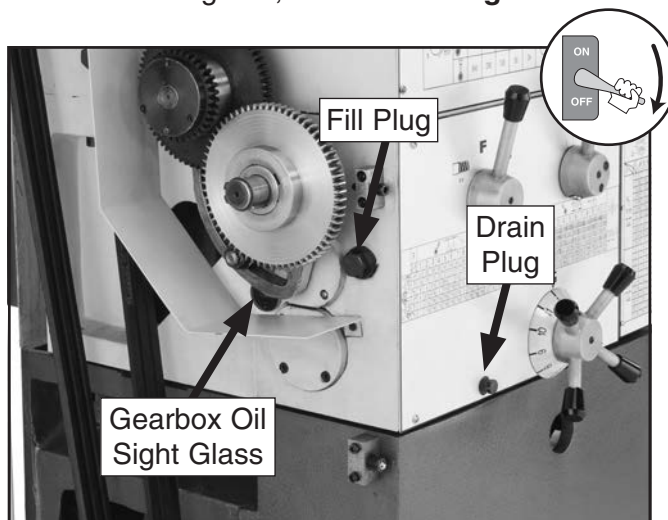
1. DISCONNECT LATHE FROM POWER!
2. Open the end-gear cover.
3. Remove the V-belts so that oil does not get on them, necessitating their replacement (refer to **Replacing V-Belts** on **Page 82** for detailed instructions).
4. Remove the fill plug from the top of the headstock.
5. Place a 5-gallon catch pan under the headstock drain plug (see **Figure 112**), then remove the drain plug with a 24mm wrench.
6. When the headstock reservoir is empty, replace the drain plug and clean away any spilled oil.
7. Fill the headstock reservoir until the oil level is approximately halfway in the sight glass.
8. Replace and re-tension the V-belts (refer to **Replacing V-Belts** on **Page 81**), then close the end-gear cover before re-connecting the lathe to power.

### Quick-Change Gearbox

Oil Type .... Grizzly T23962 or ISO 68 Equivalent  
Oil Amount..... 9.5 Quarts  
Check/Add Frequency ..... Daily  
Change ..... Every 1000 Operating Hours

#### Checking Oil Level

The gearbox reservoir has the proper amount of oil when the oil level in the sight glass is approximately halfway. The oil sight glass is located below the end gears, as shown in **Figure 113**.



**Figure 113.** Location of quick-change oil sight glass fill and drain plugs.

#### Changing Oil

Change the quick-change gearbox oil after the first 300 hours of use, then after every 1000 hours of use. Place a catch pan under the quick-change gearbox drain plug (see **Figure 113**). Use a 24mm wrench to remove the gearbox fill plug (see **Figure 113**), then remove the drain plug with a 14mm wrench and allow the gearbox reservoir to empty. Re-install the drain plug and add oil until the level is approximately halfway in the gearbox oil sight glass, then re-install the fill plug.



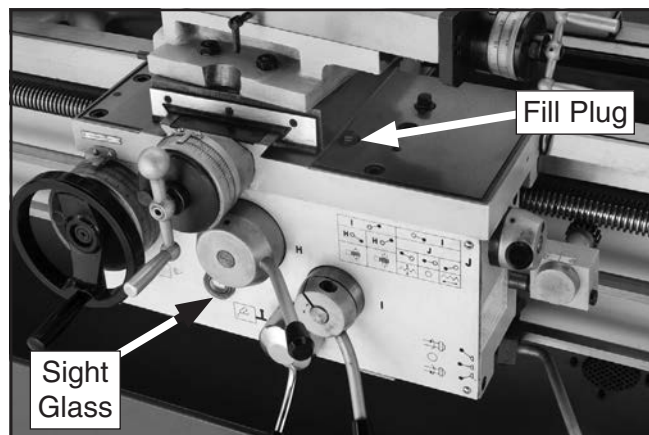


## Apron

Oil Type .... Grizzly T23962 or ISO 68 Equivalent  
Oil Amount..... 6.5 Quarts  
Check/Add Frequency ..... Daily  
Change ..... Every 1000 Operating Hours

### Checking Oil Level

The apron oil sight glass is on the front of the apron, as shown in **Figure 114**. Maintain the oil volume so that the level is approximately halfway in the sight glass.

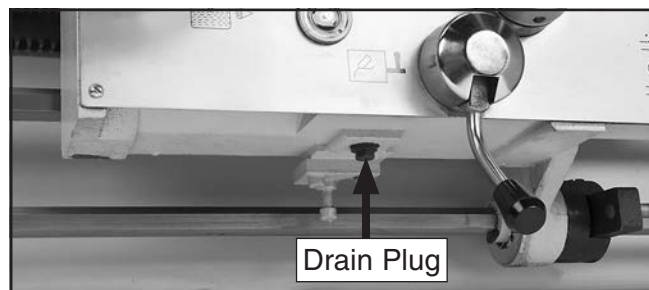


**Figure 114.** Location of apron oil sight glass.

### Changing Oil & Flushing Reservoir

Small metal particles may accumulate at the bottom of the reservoir with normal use. Therefore, to keep the reservoir clean, drain and flush it after the first 300 hours, then after every 1000 hours.

Place a catch pan under the apron drain plug shown in **Figure 115**, then use a 13mm wrench to remove the fill plug and drain plug, then empty the reservoir.

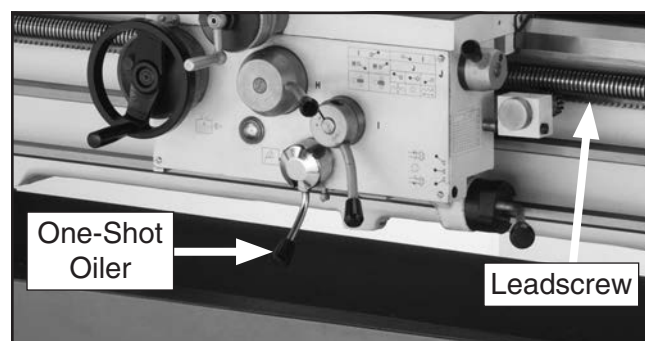


**Figure 115.** Location of apron drain plug.

Flush the reservoir by pouring a small amount of clean oil into the fill hole and allowing it to drain out the bottom. Replace the drain plug, add oil as previously described, then re-install the fill plug.

## One-Shot Oiler

The one-shot oiler shown in **Figure 116** lubricates the bedways ways.



**Figure 116.** Location of one-shot oiler on the apron.

To use the one-shot oiler, pull the pump lever six times. The pump draws oil from the apron reservoir and then forces it through drilled passages in the carriage and onto the bedways.

Repeat this process while moving the carriage through its full range of movement to distribute oil along the bedways.

Lubricate the bedways before and after operating the lathe. If the lathe is in a moist or dirty environment, increase the lubrication interval.

Check the apron oil level through the sight glass before using the one-shot oiler to make sure the reservoir has enough oil.

## Longitudinal Leadscrew

Oil Type .... Grizzly T23962 or ISO 68 Equivalent  
Oil Amount..... As Needed  
Lubrication Frequency ..... Daily

Before lubricating the leadscrew (see **Figure 116**), clean it first with mineral spirits. A stiff brush works well to help clean out the threads. Make sure to move the carriage out of the way, so you can clean the entire length of the leadscrew.

Apply a thin coat of oil along the length of the leadscrew. Use a stiff brush to make sure the oil is applied evenly and down into the threads.

**Note:** In some environments, abrasive material can become caught in the leadscrew lubricant and drawn into the half nut. In this case, lubricate the leadscrew with a quality dry lubricant.





## Ball Oilers

Oil Type .... Grizzly T23963 or ISO 32 Equivalent  
Oil Amount.....1 or 2 Squirts  
Lubrication Frequency..... Daily

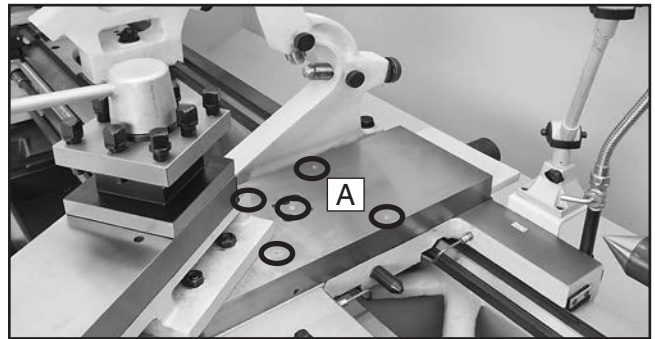
This lathe has 11 ball oilers that should be oiled on a daily basis before beginning operation. Refer to **Figures 117–121** for their locations.

### Ball Oilers

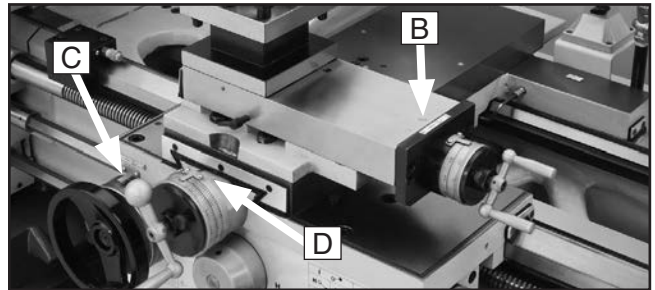
Proper lubrication of ball oilers is done with a pump-type oil can that has a plastic or rubberized cone tip. We do not recommend using metal needle or lance tips, as they can push the ball too far into the oiler, break the spring seat, and lodge the ball in the oil galley.

Lubricate the ball oilers before and after machine use, and more frequently under heavy use. When lubricating ball oilers, first clean the outside surface to remove any dust or grime. Push the rubber or plastic tip of the oil can nozzle against the ball oiler to create a hydraulic seal, then pump the oil can once or twice. If you see sludge and contaminants coming out of the lubrication area, keep pumping the oil can until the oil runs clear. When finished, wipe away any excess oil.

- A. Cross-slide leadscrew & slides
- B. Compound-rest leadscrew & slides
- C. Carriage handwheel
- D. Cross slide handwheel
- E. Leadscrew feed rod selection lever
- F. Tailstock ball oiler
- G. Leadscrew end bearing



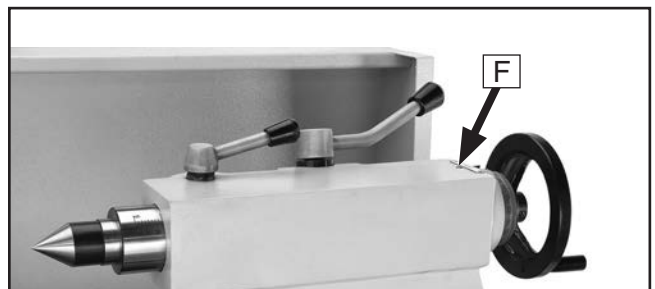
**Figure 117.** Saddle and slide ball oilers.



**Figure 118.** Handwheel ball oilers.



**Figure 119.** Leadscrew selection lever ball oiler.



**Figure 120.** Tailstock ball oiler.



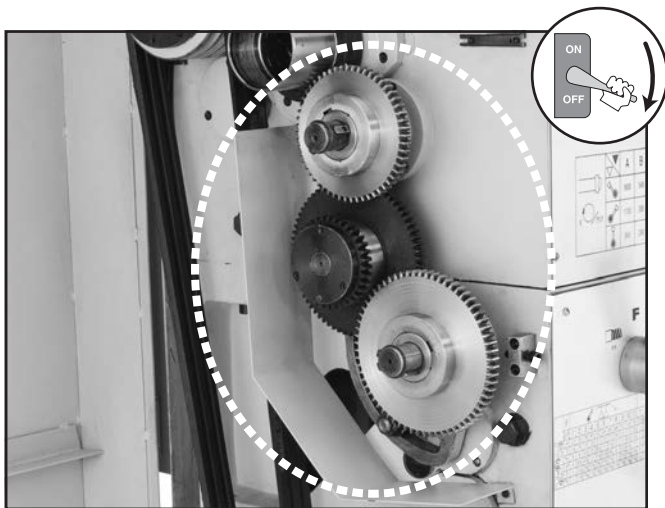
**Figure 121.** Leadscrew ball oiler.



## End Gears

Grease Type..... T23964 or NLGI#2 Equivalent  
Lubrication ..... Every 50 Operating Hours

The end gears, shown in **Figure 122**, should always have a thin coat of heavy grease to minimize corrosion, noise, and wear. Wipe away excess grease that could be thrown onto the V-belts and reduce optimal power transmission from the motor.



**Figure 122.** End gears.

### ***Handling & Care***

Make sure to clean and lubricate any gears you install or change. Be very careful during handling and storage—the grease coating on the gears will easily pickup dirt or debris, which can then spread to the other gears and increase the rate of wear.

Make sure the end-gear cover remains closed whenever possible to keep the gears free of dust or debris from the outside environment.

### ***Lubricating***

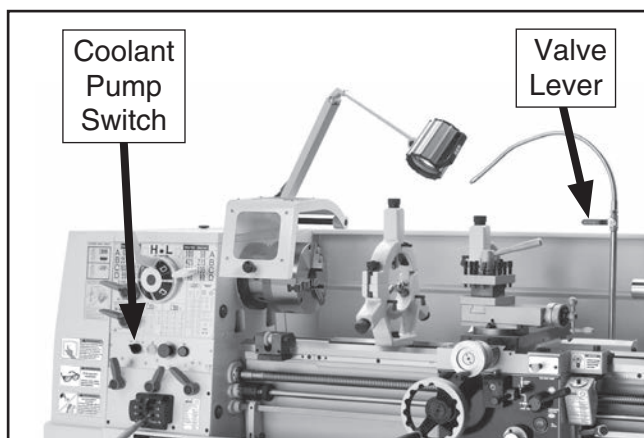
1. DISCONNECT LATHE FROM POWER!
2. Open the end-gear cover and remove all the end gears shown in **Figure 122**.
3. Clean the end gears thoroughly with mineral spirits to remove the old grease. Use a small brush if necessary to clean between the teeth.
4. Clean the shafts, and wipe away any grease splatters in the vicinity and on the inside of the end-gear cover.
5. Using a clean brush, apply a thin layer of grease on the gears. Make sure to get grease between the gear teeth, but do not fill the teeth valleys.
6. Install the end gears and mesh them together with an approximate 0.002"—0.004" backlash. Once the gears are meshed together, apply a small dab of grease between them where they mesh together—this grease will be distributed when the gears rotate and re-coat any areas scraped off during installation.
7. Close the end-gear cover before re-connecting the lathe to power.



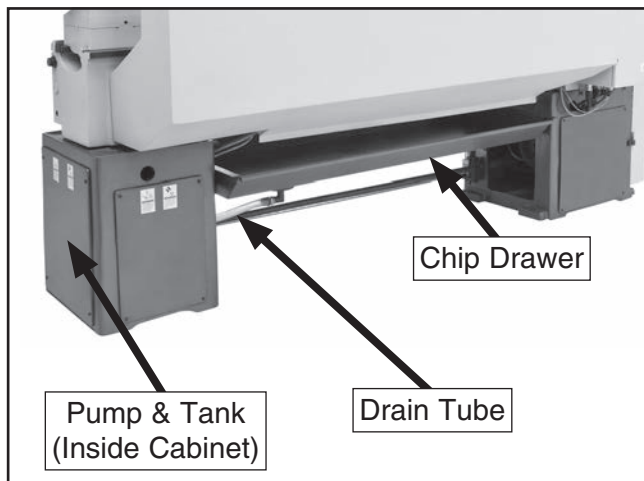
# Coolant System Service

The coolant system consists of a fluid tank, pump, and flexible nozzle. The pump pulls fluid from the tank and sends it to the valve, which controls the flow of coolant to the nozzle. As the fluid leaves the work area, it drains back into the tank through the chip drawer where the swarf is screened out.

Use **Figures 123–124** to identify the locations of the coolant system controls and components.



**Figure 123.** Coolant controls.



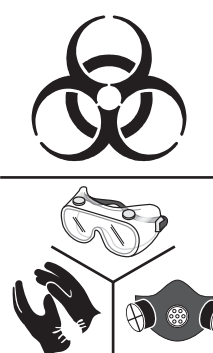
**Figure 124.** Additional coolant components.

Although most swarf from machining operations is screened out of the coolant before it returns to the tank, small particles will accumulate in the bottom of the tank in the form of sludge. To prevent this sludge from being pulled into the pump and damaging it, the pump's intake is positioned a couple inches from the bottom of the tank. This works well when the tank is regularly cleaned; however, if too much sludge is allowed to accumulate before the tank is cleaned, the pump will inevitably begin sucking it up.

## Hazards

As coolant ages and gets used, dangerous microbes can proliferate and create a biological hazard. The risk of exposure to this hazard can be greatly reduced by replacing the old fluid on a monthly basis, or as indicated by the fluid manufacturer.

The important thing to keep in mind when working with the coolant is to minimize exposure to your skin, eyes, and lungs by wearing the proper PPE (Personal Protective Equipment), such as long-sleeve waterproof gloves, protective clothing, splash-resistant safety goggles, and a NIOSH-approved respirator.

	<p><b>!WARNING</b> <b>BIOLOGICAL &amp; POISON HAZARD!</b></p> <p>Use the correct personal protection equipment when handling coolant. Follow federal, state, and fluid manufacturer requirements for proper disposal.</p>
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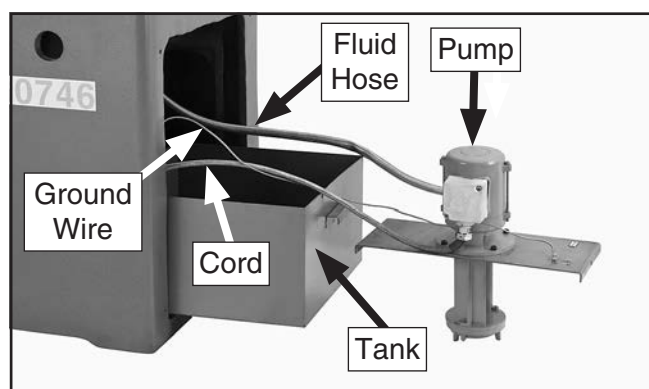


## Adding Coolant

Items Needed:	Qty
Safety Wear.....	See <b>Hazards</b> on <b>Page 72</b>
New Coolant.....	5 Gallons
Slotted Screwdriver #2.....	1
Disposable Shop Rags.....	As Needed

### To add coolant:

1. DISCONNECT LATHE FROM POWER!
2. Remove the access cover from the side of the right stand, then slide the tank out, as shown in **Figure 125**.



**Figure 125.** Coolant tank and pump.

3. Pour coolant into the tank until it is approximately 1" from the top.
4. Slide the tank back into the cabinet and replace the access cover.

## Changing Coolant

When you replace the old coolant, take the time to thoroughly clean out the chip drawer and fluid tank. The entire job only takes about a ½ hour when you are prepared with the proper materials and tools. Make sure to dispose of old fluid according to federal, state, and fluid manufacturer's requirements.

Items Needed:	Qty
Safety Wear.....	See <b>Hazards</b> on <b>Page 72</b>
New Coolant.....	5 Gallons
Empty 5-Gallon Buckets w/Lid.....	2
Slotted Screwdriver #2.....	1
Disposable Shop Rags.....	As Needed
Magnets (Optional).....	As Many As Desired

### To change the coolant:

1. Position the coolant nozzle over the back of the back splash so that it is pointing behind the lathe.
2. Place the 5-gallon bucket behind the lathe and under the coolant nozzle. Have another person hold the bucket up to the nozzle to prevent coolant from splashing out.
3. Turn the coolant pump **ON** and pump the old fluid out of the reservoir. Turn the pump **OFF** immediately after the fluid stops flowing.

## NOTICE

Running the coolant pump longer than necessary for this procedure without adequate fluid in the tank may permanently damage it, which will not be covered under warranty.

4. DISCONNECT LATHE FROM POWER!
5. Remove the access cover from the side of the right stand, then slide the tank out.

**Note:** The fluid hose, pump cord, and ground wire (see **Figure 125**) were purposely left long, so the tank can be removed and dumped out without disconnecting them from the tank. However, the drain tube (see **Figure 124** on **Page 72**) may come out of the tank when you empty it.

6. Pour the remaining coolant into the 5-gallon bucket and close the lid.
7. Clean all the sludge out of the bottom of the tank and then flush it clean. Use the second bucket to hold the waste and make sure to seal the lid closed when done.

Dispose of the old coolant and swarf according to federal, state, and fluid manufacturer's requirements.





8. Slide the tank partially into the base and insert the drain tube into the tank if it came out earlier.

**Tip:** *Leave one or more magnets at the bottom of the tank to collect metal chips and make cleanup easier next time. This will also help keep small metal chips out of the pump.*

9. Refill the tank with new coolant, then slide it completely into the base.
10. Replace the access cover panel.
11. Re-connect the lathe to power and point the nozzle into the chip drawer.
12. Reset the EMERGENCY STOP button.
13. Turn the coolant pump **ON** to verify that fluid cycles properly, then turn it **OFF**.

## Machine Storage

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To prevent the development of rust and corrosion, the lathe must be properly prepared if it will be stored for a long period of time. Doing this will ensure the lathe remains in good condition for later use.

### Preparing Lathe for Storage

1. Run the lathe and bring all reservoirs to operating temperature, then drain and refill them with clean oil.
2. Pump out the old coolant, then add a few drops of way oil and blow out the lines with compressed air.
3. **DISCONNECT LATHE FROM POWER!**
4. Thoroughly clean all unpainted, bare metal surfaces, then apply a liberal coat of way oil, heavy grease, or rust preventative. Take care to ensure these surfaces are completely covered but that the rust preventative or grease is kept off of painted surfaces.

5. Lubricate the machine as outlined in the lubrication section. Be sure to use an oil can to purge all ball oilers and oil passages with fresh oil.
6. Loosen or remove the V-belts so they do not become stretched during the storage period. (Be sure to place a maintenance note near the power button as a reminder that the belts have been loosened or removed.)
7. Place a few moisture absorbing desiccant packs inside of the electrical box.
8. Cover the lathe and place it in a dry area that is out of direct sunlight and away from hazardous fumes, paint, solvents, or gas. Fumes and sunlight can bleach or discolor paint.
9. Every few months, rotate by hand all gear-driven components a few times in several gear selections. This will keep the bearings, bushings, gears, and shafts well lubricated and protected from corrosion—especially during the winter months.

Slide the carriage, micrometer stop, tailstock, and steady rest down the lathe bed to make sure that way spotting is not beginning to occur.

### Bringing Lathe Out of Storage

1. Re-install the V-belts and re-tension them (refer to **Page 81**) if you removed them for storage purposes.
2. Remove the moisture-absorbing desiccant packs from the electrical box.
3. Repeat the **Test Run** and **Spindle Break-In** procedures, beginning on **Page 31**.
4. Add coolant, as described in **Coolant System Service** on **Page 73**.



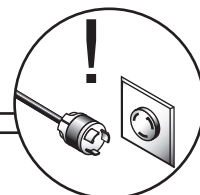


# SECTION 7: SERVICE

Review the troubleshooting and procedures in this section if a problem develops with your machine. If you need replacement parts or additional help with a procedure, call our Technical Support at (570) 546-9663.

**Note:** Please gather the serial number and manufacture date of your machine before calling.

## Troubleshooting



### Motor & Electrical

Symptom	Possible Cause	Possible Solution
Machine does not start or a circuit breaker trips.	<ol style="list-style-type: none"> <li>1. EMERGENCY STOP button depressed/at fault.</li> <li>2. Main power switch OFF or at fault.</li> <li>3. Incorrect power supply voltage or circuit size.</li> <li>4. Power supply circuit breaker tripped or fuse blown.</li> <li>5. Motor wires connected incorrectly.</li> <li>6. Thermal overload relay has tripped.</li> <li>7. Contactor not energized/has poor contacts.</li> <li>8. Wiring is open/has high resistance.</li> <li>9. Motor is at fault.</li> </ol>	<ol style="list-style-type: none"> <li>1. Rotate button head to reset. Replace if at fault.</li> <li>2. Turn main power switch ON or replace if at fault.</li> <li>3. Ensure correct power supply voltage and circuit size.</li> <li>4. Ensure circuit is sized correctly and free of shorts. Reset circuit breaker or replace fuse.</li> <li>5. Correct motor wiring connections. (<b>Page 87</b>).</li> <li>6. Reset; adjust trip load dial if necessary; replace.</li> <li>7. Test all legs for power/replace if at fault.</li> <li>8. Check/fix broken, disconnected, or corroded wires.</li> <li>9. Test/repair/replace.</li> </ol>
Motor stalls or is underpowered.	<ol style="list-style-type: none"> <li>1. Gearbox at fault.</li> <li>2. Belt(s) slipping.</li> <li>3. Motor wired incorrectly.</li> <li>4. Motor bearings at fault.</li> <li>5. Motor overheated.</li> <li>6. Contactor not energized/has poor contacts.</li> <li>7. Motor overheated. Contactor not energized/has poor contacts.</li> <li>8. Motor at fault.</li> </ol>	<ol style="list-style-type: none"> <li>1. Select appropriate gear ratio; replace broken or slipping gears.</li> <li>2. Tension/replace belt(s); ensure pulleys are aligned.</li> <li>3. Wire motor correctly.</li> <li>4. Test/repair/replace.</li> <li>5. Clean motor, let cool, and reduce workload.</li> <li>6. Test all legs for power/replace if at fault.</li> <li>7. Clean motor, let cool, and reduce workload. Test all legs for power/replace if at fault.</li> <li>8. Test/repair/replace.</li> </ol>
Loud, repetitious noise coming from lathe at or near the motor.	<ol style="list-style-type: none"> <li>1. Pulley set screws or keys are missing or loose.</li> <li>2. Motor fan is hitting the cover.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inspect keys and set screws. Replace or tighten if necessary.</li> <li>2. Tighten fan, shim cover, or replace items.</li> </ol>
Motor overheats.	<ol style="list-style-type: none"> <li>1. Motor overloaded.</li> </ol>	<ol style="list-style-type: none"> <li>1. Allow motor to cool; reduce load on motor.</li> </ol>
Motor is loud when cutting, or bogs down under load.	<ol style="list-style-type: none"> <li>1. Excessive depth of cut or feed rate.</li> <li>2. Spindle speed or feed rate wrong for cutting operation.</li> <li>3. Cutting tool is dull.</li> </ol>	<ol style="list-style-type: none"> <li>1. Decrease depth of cut or feed rate.</li> <li>2. Refer to the feeds and speed charts in <b>Machinery's Handbook</b> or a speeds and feeds calculator on the internet.</li> <li>3. Sharpen or replace the cutting tool.</li> </ol>



## Lathe Operation

Symptom	Possible Cause	Possible Solution
Entire machine vibrates upon startup and while running.	<ol style="list-style-type: none"> <li>1. Workpiece is unbalanced.</li> <li>2. Loose or damaged V-belt(s).</li> <li>3. V-belt pulleys are not properly aligned.</li> <li>4. Worn or broken gear present.</li> <li>5. Chuck or faceplate is unbalanced.</li> <li>6. Gears not aligned in headstock or no backlash.</li> <li>7. Broken gear or bad bearing.</li> <li>8. Workpiece is hitting stationary object.</li> <li>9. Spindle bearings at fault.</li> </ol>	<ol style="list-style-type: none"> <li>1. Re-install workpiece as centered with the spindle bore as possible.</li> <li>2. Re-tension/replace the V-belt(s) as necessary (see <b>Page 81</b>).</li> <li>3. Align the V-belt pulleys.</li> <li>4. Inspect gears, and replace if necessary.</li> <li>5. Re-balance chuck or faceplate; contact a local machine shop for help.</li> <li>6. Adjust change gears and establish backlash.</li> <li>7. Replace broken gear or bearing.</li> <li>8. Stop lathe immediately and correct interference problem.</li> <li>9. Reset spindle bearing preload or replace worn spindle bearings.</li> </ol>
Bad surface finish.	<ol style="list-style-type: none"> <li>1. Wrong spindle speed or feed rate.</li> <li>2. Dull tooling or poor tool selection.</li> <li>3. Tool height not at spindle centerline.</li> <li>4. Too much play in gibs.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust for appropriate spindle speed and feed rate.</li> <li>2. Sharpen tooling or select a better tool for the intended operation.</li> <li>3. Adjust tool height to spindle centerline (see <b>Page 49</b>).</li> <li>4. Tighten gibs (see <b>Page 79</b>).</li> </ol>
Tapered tool difficult to remove from tailstock quill.	<ol style="list-style-type: none"> <li>1. Quill is not retracted all the way back into the tailstock.</li> <li>2. Contaminants not removed from taper before inserting into quill.</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn the quill handwheel until it forces the tapered tool out of quill.</li> <li>2. Clean the taper and bore, then re-install tool.</li> </ol>
Cross slide, compound rest, or carriage feed has sloppy operation.	<ol style="list-style-type: none"> <li>1. Gibs are out of adjustment.</li> <li>2. Handwheel is loose or backlash is high.</li> <li>3. Leadscrew mechanism worn or out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust gibs (see <b>Page 79</b>).</li> <li>2. Tighten handwheel fasteners, adjust handwheel backlash to a minimum (see <b>Page 78</b>).</li> <li>3. Adjust leadscrew to remove end play (see <b>Page 79</b>).</li> </ol>
Cross slide, compound, or carriage handwheels hard to move.	<ol style="list-style-type: none"> <li>1. Dovetail ways loaded with shavings, dust, or grime.</li> <li>2. Gibs are too tight.</li> <li>3. Backlash setting too tight.</li> <li>4. Bedways are dry.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove gibs, clean ways, lubricate, and re-adjust gibs.</li> <li>2. Loosen gibs slightly (see <b>Page 79</b>), and lubricate bedways.</li> <li>3. Slightly loosen backlash setting (see <b>Page 78</b>).</li> <li>4. Lubricate bedways/ball oilers.</li> </ol>
Cutting tool or machine components vibrate excessively during cutting.	<ol style="list-style-type: none"> <li>1. Tool holder not tight enough.</li> <li>2. Cutting tool sticks too far out of tool holder; lack of support.</li> <li>3. Gibs are out of adjustment.</li> <li>4. Dull cutting tool.</li> <li>5. Incorrect spindle speed or feed rate.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for debris, clean, and re-tighten.</li> <li>2. Re-install cutting tool so no more than <math>\frac{1}{8}</math> of the total length is sticking out of tool holder.</li> <li>3. Adjust gibs at affected component (see <b>Page 79</b>).</li> <li>4. Replace or resharpen cutting tool.</li> <li>5. Use the recommended spindle speed and feed rate.</li> </ol>



Symptom	Possible Cause	Possible Solution
Workpiece is tapered.	1. Headstock and tailstock are not properly aligned with each other.	1. Re-align the tailstock to the headstock spindle centerline (see <b>Page 42</b> ).
Chuck jaws will not move or do not move easily.	1. Chips lodged in the jaws or scroll plate.	1. Remove jaws, clean and lubricate scroll plate, then replace jaws.
Carriage will not feed or is hard to move.	1. Gears are not all engaged. 2. Half nut lever engaged. 3. Feed lever not engaged. 4. Leadscrew feed rod selection lever is up. 5. Carriage lock is tightened down.  6. Chips have loaded up on bedways.  7. Bedways are dry and in need of lubrication. 8. Gibs are too tight. 9. Gears broken.	1. Adjust quick change gear levers and dial. 2. Disengage half nut lever. 3. Engage feed lever. 4. Place lever in down position. 5. Check to make sure the carriage lock bolt is fully released. 6. Frequently clean away chips that load up during turning operations. 7. Lubricate bedways/ball oilers. 8. Loosen gibs slightly (see <b>Page 79</b> ). 9. Replace gears.
Gear change levers will not shift into position.	1. Gears not aligned inside headstock/Quick-Change gearbox.	1. Rotate spindle by hand with light pressure on the lever until gear falls into place.



# Backlash Adjustment

Backlash is the amount of free play felt while changing rotation directions with the handwheel. This can be adjusted on the compound rest and cross slide leadscrews. Before beginning any adjustment, make sure all associated components are cleaned and lubricated and locks are loose.

When adjusting backlash, tighten the components enough to remove backlash, but not so much that the components bind the leadscrew, making it hard to turn. Overtightening will cause excessive wear to the sliding block and leadscrew.

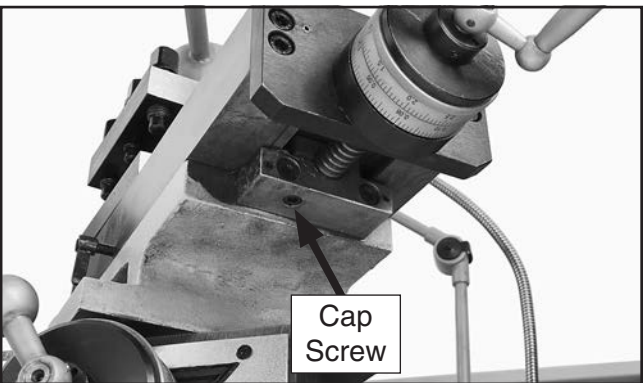
**NOTICE**

Reducing backlash to less than 0.002" is impractical and can lead to accelerated wear of the wedge, nut, and leadscrew. Avoid the temptation to overtighten the backlash set screw while adjusting.

## Compound Rest

Tools Needed:	Qty
Hex Wrench 5mm.....	1

The compound rest backlash is adjusted by tightening the cap screw shown in **Figure 126**. When the cap screw is tightened, the leadscrew nut draws down on the leadscrew, removing play between these components.



**Figure 126.** Compound rest backlash adjustment cap screw.

To adjust the backlash, rock the handwheel back and forth, and tighten the cap screw slowly until the backlash is approximately 0.002"–0.003", as indicated on the graduated dial.

If you end up adjusting the nut too tight, loosen the cap screw, tap the compound rest a few times with a rubber or wooden mallet, and turn the handwheel slowly back and forth until it moves freely—then try again.

## Cross Slide

Tools Needed:	Qty
Hex Wrench 6mm .....	1

The cross slide backlash is adjusted by loosening the cap screw shown in **Figure 127**. This will push the leadscrew nut against the leadscrew, taking up lash between these components.



**Figure 127.** Cross slide backlash adjustment screw.

Adjust the backlash in a similar manner to that for the compound rest.



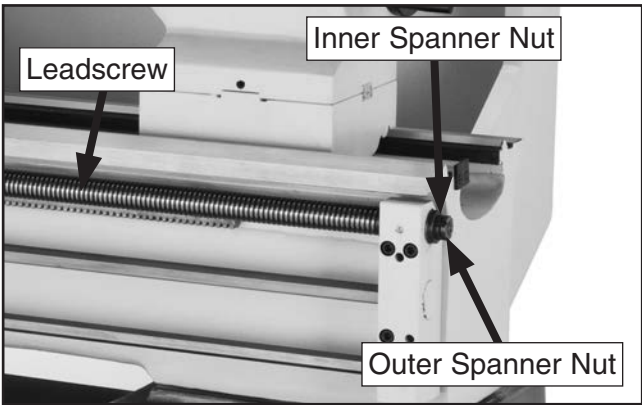
# Leadscrew End-Play Adjustment

After a long period of time, you may find that the leadscrew develops excessive end play. This lathe is designed so that end play can be removed with a simple adjustment.

Items Needed	Qty
Spanner Wrench.....	1

**To remove leadscrew end play:**

- 1. DISCONNECT LATHE FROM POWER.
- 2. Loosen the outer spanner nut (see **Figure 128**).



**Figure 128.** Leadscrew and spanner nuts.

- 3. Place a dial indicator on the end of the leadscrew.
- 4. Rotate the carriage handwheel to move the carriage toward the tailstock, then tighten the inner spanner nut (see **Figure 128**) until there is 0.001"–0.002" of end play.
- 5. Tighten the outer spanner nut until it is snug against the inner spanner nut to secure the setting.

# Gib Adjustment

The goal of adjusting the gib screws is to remove sloppiness or "play" from the ways without over-adjusting them to the point where they become stiff and difficult to move.

In general, loose gibs cause poor finishes and tool chatter; however, over-tightened gibs cause premature wear and make it difficult to turn the handwheels.

The cross-slide and compound slide on this lathe each use a long steel wedge called a gib that is positioned between the component and its dovetailed-ways. A gib screw at one end moves the gib. Depending upon which direction the gib moves, the space between the sliding ways increases or decreases to control the rigidity of the cross slide and compound slide.

Before adjusting the gibs, loosen the locks for the devices so the gibs can slide freely during adjustment, then lubricate the ways.

The gib adjustment process usually requires some trial-and-error. Repeat the process as necessary until you find the best balance between loose and stiff movement. Most machinists find that the ideal gib adjustment is one where a small amount of drag or resistance is present, yet the handwheels are still easy to move.

Tools Needed	Qty
Standard Screwdriver #2.....	1
Slotted Screwdriver #2 .....	1

## Cross Slide Gib

Make sure the ways and leadscrew have been cleaned and re-lubricated before beginning any adjustments. Refer to **Ball Oiler Lubrication** on **Page 70** for instructions and lubricant specifications.

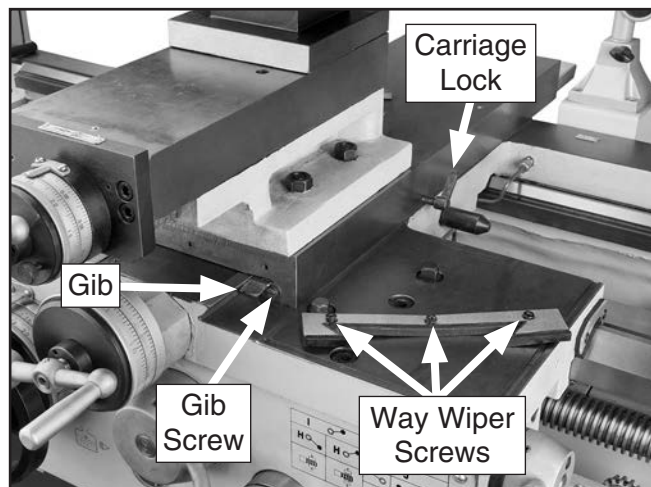
**To adjust the cross slide gib:**

- 1. DISCONNECT LATHE FROM POWER!



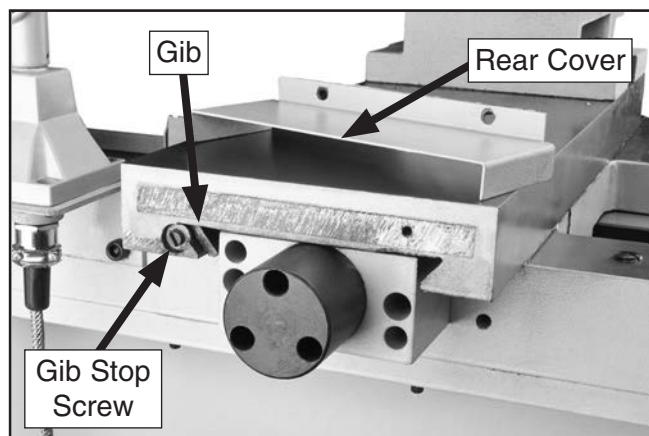


2. Unthread the three screws that secure the cross slide way wiper, then remove it (see **Figure 129**).



**Figure 129.** Cross slide gib components.

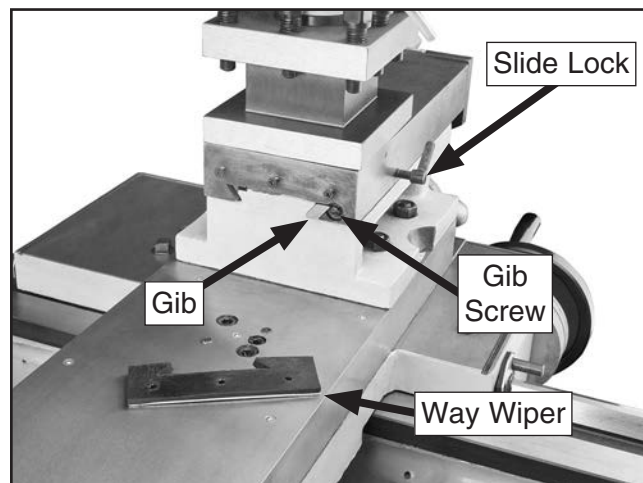
3. Loosen the carriage lock (see **Figure 129**).
4. Adjust the gib screw as follows:
  - To increase the slide tension, tighten the gib screw  $\frac{1}{8}$  turn.
  - To decrease the slide tension, loosen the gib screw  $\frac{1}{8}$  turn.
5. Repeat adjustments as necessary until the gib screw drag is acceptable.
6. To set the rear gib stop screw, remove the rear cover (see **Figure 130**), tighten the gib stop screw against the gib, then re-install the cover.



**Figure 130.** Cross slide gib stop screw.

## Compound Slide Gib

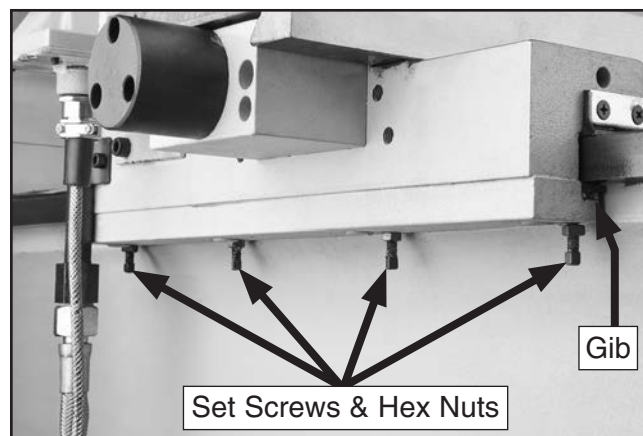
**Figure 131** shows the gib location on the back of the compound slide. The compound slide gib adjusts in the same manner and with the same tools as the cross slide gib. Remove the compound slide way wiper to access the gib and gib screw.



**Figure 131.** Compound slide gib components.

## Saddle Gib

The saddle gib is located on the bottom of the back edge of the cross slide (see **Figure 132**). This gib is designed differently than the cross or compound slide gibs. Instead of being a wedge-shaped plate, it is a flat bar. The gib pressure is applied by four set screws. Hex nuts secure these set screws in place, so they will not loosen during operation.



**Figure 132.** Saddle gib components.

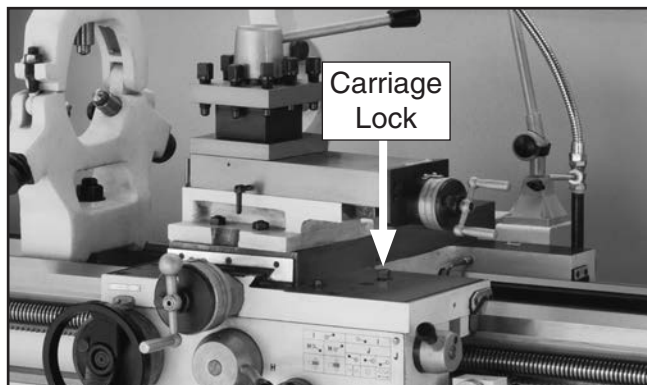
### Tools Needed

	Qty
Wrench 7mm .....	1
Wrench 10mm .....	1



### To adjust the saddle slide gib:

1. DISCONNECT LATHE FROM POWER!
2. Clean and lubricate the lathe bedways (refer to **Page 69**).
3. If the carriage lock (see **Figure 133**) is tight, loosen it two turns.



**Figure 133.** Location of carriage lock.

4. To access the saddle gib, remove the back-splash.
5. Loosen the hex nuts on the four set screws shown in **Figure 132** on **Page 80**, and adjust the set screws the same amount as follows:
  - To tighten the carriage gib, tighten the set screws in equal amounts.
  - To loosen the gib, loosen the set screws in equal amounts.
6. Move the carriage back and forth and repeat adjustments as necessary until the gib pressure is acceptable.
7. Hold the set screws in place and tighten the hex nuts.
8. Re-install the backsplash.

## V-Belts

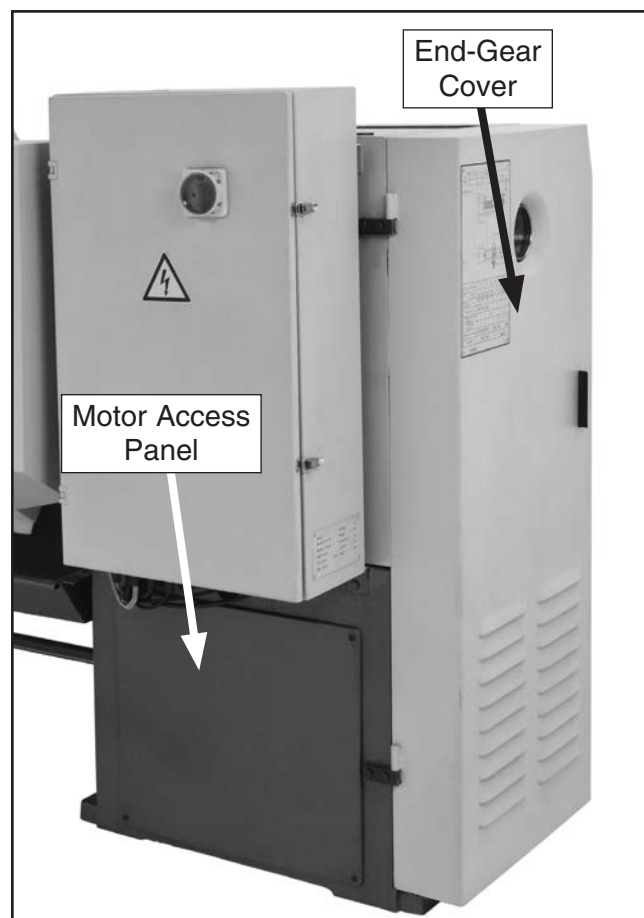
V-belts stretch and wear with use, so check the tension after the first three months and then every six months to ensure optimal power transmission. Replace all of the V-belts as a matched set if any of them show signs of glazing, fraying, or cracking.

### Tensioning V-Belts

Tools Needed:	Qty
Slotted Screwdriver #2 .....	1
Open End Wrench 24mm .....	1

### To tension the V-Belts:

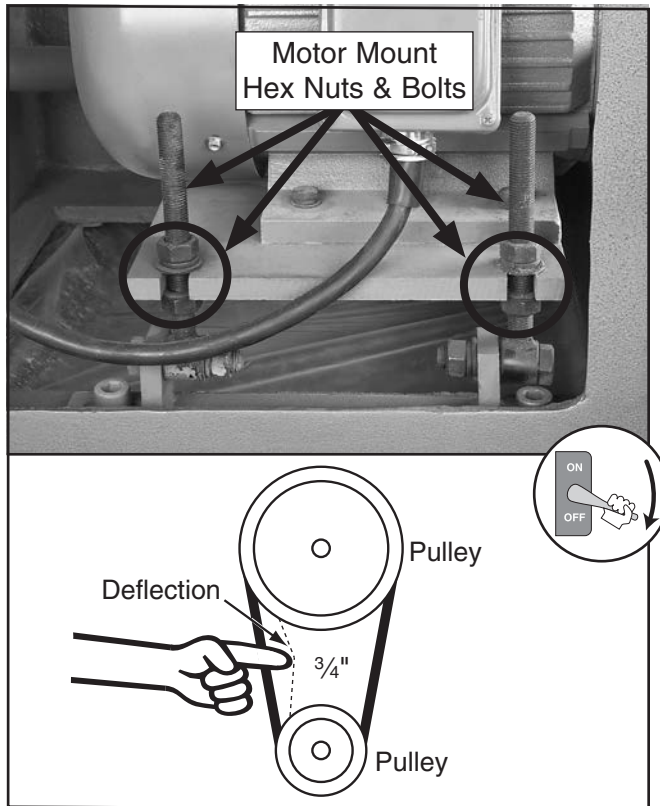
1. DISCONNECT LATHE FROM POWER!
2. Open the end-gear cover and remove the motor access panel to expose the V-belts, pulleys, and motor (see **Figure 134**).



**Figure 134.** End-gear cover and motor access panel location.



3. Adjust the hex nuts on the motor mount bolts (see **Figure 135**) until there is approximately  $\frac{3}{4}$ " deflection in each V-belt when it is pushed with moderate pressure.



**Figure 135.** Adjusting V-belt tension.

4. Firmly tighten the hex nuts to secure the setting, then re-install the motor access panel and close the end-gear cover.

## Replacing V-Belts

### Tools Needed:

	Qty
Slotted Screwdriver #2 .....	1
Open End Wrench 10mm .....	1

1. DISCONNECT LATHE FROM POWER!
2. Open the end-gear cover and remove the motor access panel (see **Figure 134** on **Page 81**).
3. Adjust the hex nuts on the motor mount bolts (see **Figure 135** to raise the motor, then remove the V-belts.
4. Install the new V-belts as a matched set so they equally share the load.
5. Tension the V-belts. (Refer to **Tensioning V-Belts** on **Page 81**.)
6. Re-install the end-gear cover and motor access panel.



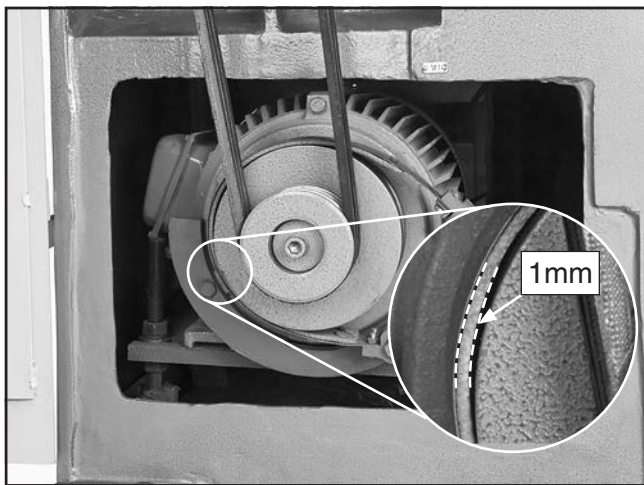
# Brake & Switch

As the brake lining wears, the foot pedal develops more travel. If the brake band is not adjusted to compensate for normal wear, the limit switch will still turn the lathe **OFF**, but the spindle will not stop as quickly. It is especially important that the brake is kept properly adjusted so you can quickly stop the spindle in an emergency.

Tools Needed:	Qty
Wrench 17mm.....	1
Hex Wrench 8mm.....	1

## Adjusting Brake

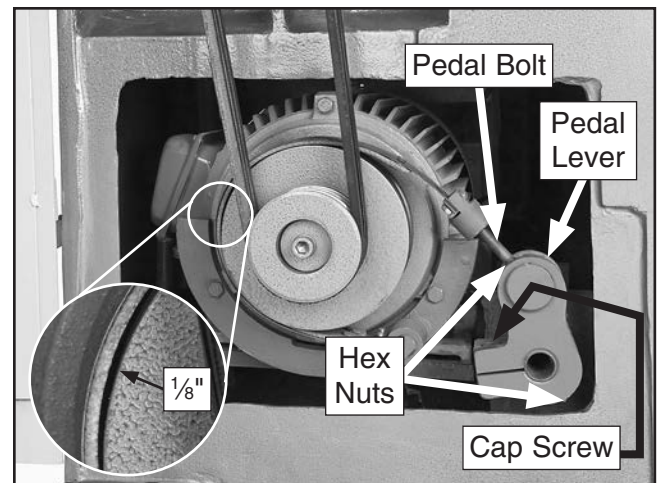
1. DISCONNECT LATHE FROM POWER!
2. Put on a respirator and eye protection to protect yourself from hazardous brake dust.
3. Open the end-gear cover.
4. Measure the remaining brake band lining at the thinnest point, which is usually at the 8 o'clock position, as shown in **Figure 136**.



**Figure 136.** Minimum brake belt thickness.

**Note:** When the brake band is new, the lining is approximately 4mm thick. If the lining thickness wears to 1mm or less, the brake band must be replaced.

5. Adjust the hex nuts on the pedal bolt shown in **Figure 137** to tighten the brake band so there is approximately  $\frac{1}{8}$ " clearance between the pad and hub around its circumference.



**Figure 137.** Brake tensioning components.

—If additional brake band tension is needed, loosen the cap screw shown in **Figure 137**, pivot the pedal lever to the right and tighten the cap screw.

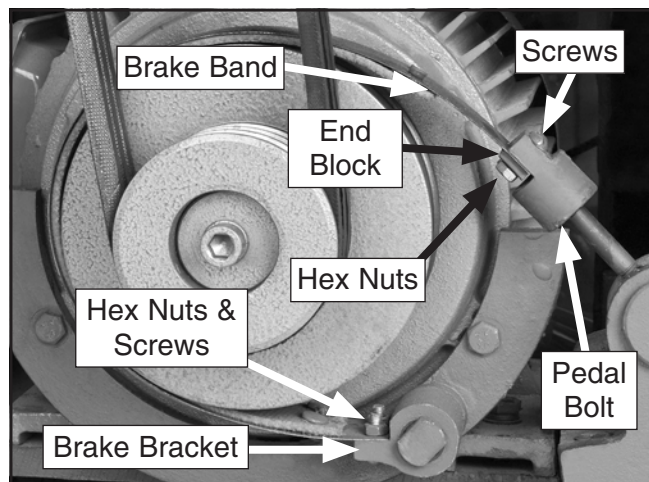
6. Close the end-gear cover, connect the lathe to power, then test the brake pedal as follows:
  - a. Start the lathe, then lightly press the foot pedal. The motor should shut **OFF**.
  - b. Push the foot pedal down further to stop spindle rotation. You should *not* need to press the pedal down completely to stop the spindle, nor should the spindle keep rotating. If either symptom occurs, repeat **Steps 5–6** until you are satisfied with the brake performance.





## Replacing Brake

1. DISCONNECT LATHE FROM POWER!
2. Open the end-gear cover.
3. Remove the hex nuts and screws that attach the brake band to the pedal bolt and end block shown in **Figure 138**.



**Figure 138.** Brake replacement components.

4. Remove the hex nuts and screws that attach the lower part of the brake band to the brake bracket (see **Figure 138**), then remove the brake band.
5. Install the new brake band on the brake bracket with the screws and nuts you removed in **Step 4**.
6. Pull the brake band over the drum and attach it to the pedal bolt with the screws, end block, and hex nuts removed in **Step 3**.

Refer to **Adjusting Brake** subsection to tension the brake.

## Gap Insert Removal & Installation

The gap insert directly under the spindle (see **Figure 139**) can be removed to create additional space for turning large diameter parts.

The gap insert was installed, then ground flush with the bed at the factory to ensure a precision fit and alignment. Therefore, if the gap insert is removed, it may be difficult to re-install with the same degree of accuracy.

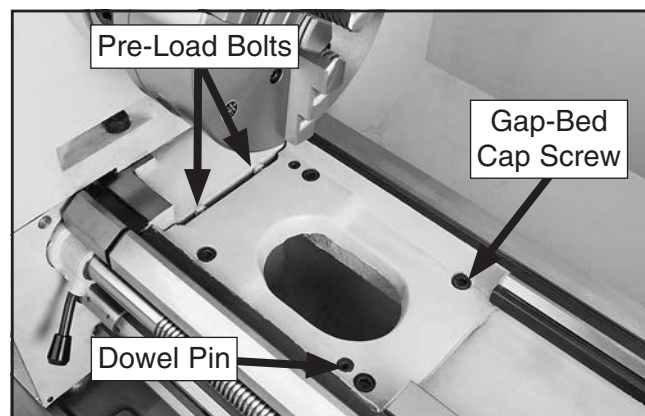


**Figure 139.** Gap insert.

Tools Needed:	Qty
Open-End Wrench 14mm.....	1
Hex Wrench 10mm.....	1
Heavy Dead Blow Hammer.....	1
Slide Hammer w/M8-1.25 Handle End Thread..	1

### Gap Removal

1. Remove the four gap-bed cap screws, shown in **Figure 140**.



**Figure 140.** Fasteners holding gap in place.





2. Tighten the two pre-load bolts so they no longer contact the headstock.
3. Use a slide hammer to remove the two dowel pins from the gap insert.
4. Tap the outside of the gap insert with a dead blow hammer to loosen it, then remove it.
6. Mount a dial indicator with a magnetic base to the top of the saddle to indicate alignment.
7. First test the peak of the two prisms of the gap insert that the saddle rides on, then test the flanks of the prisms.
8. Alternately tighten the gap bed cap screws and tap the side of the gap insert into alignment.

## Gap Installation

1. Use mineral spirits and a clean lint-free rag to clean the mating surfaces of the gap, bed, and ways. If necessary, stone the mating surfaces to remove scratches, dings, or burrs.
2. Wipe a thin layer of light machine oil on the mating surfaces.
3. Place the gap insert into the gap and use a dead-blow hammer to align the insert with the lathe bed.
4. Lightly tap the dowel pins back into their respective holes until they are seated. This process will further help align the gap insert and bed mating surfaces.
5. Install all fasteners and lightly snug them in place.
9. Inspect the gap alignment 24 hours later to make sure the gap is still aligned. If necessary, loosen the gap bed cap screws and repeat **Steps 7–8** until the insert is properly aligned.
10. Loosen the preload bolts until they contact the headstock and resistance can be felt, then tighten them an additional  $\frac{3}{4}$ -turn.



# SECTION 8: WIRING

These pages are current at the time of printing. However, in the spirit of improvement, we may make changes to the electrical systems of future machines. Compare the manufacture date of your machine to the one stated in this manual, and study this section carefully.

If there are differences between your machine and what is shown in this section, call Technical Support at (570) 546-9663 for assistance BEFORE making any changes to the wiring on your machine. An updated wiring diagram may be available. **Note:** Please gather the serial number and manufacture date of your machine before calling. This information can be found on the main machine label.

## ⚠ WARNING

### Wiring Safety Instructions

**SHOCK HAZARD.** Working on wiring that is connected to a power source is extremely dangerous. Touching electrified parts will result in personal injury including but not limited to severe burns, electrocution, or death. Disconnect the power from the machine before servicing electrical components!

**MODIFICATIONS.** Modifying the wiring beyond what is shown in the diagram may lead to unpredictable results, including serious injury or fire. This includes the installation of unapproved after-market parts.

**WIRE CONNECTIONS.** All connections must be tight to prevent wires from loosening during machine operation. Double-check all wires disconnected or connected during any wiring task to ensure tight connections.

**CIRCUIT REQUIREMENTS.** You MUST follow the requirements at the beginning of this manual when connecting your machine to a power source.

**WIRE/COMPONENT DAMAGE.** Damaged wires or components increase the risk of serious personal injury, fire, or machine damage. If you notice that any wires or components are damaged while performing a wiring task, replace those wires or components.

**MOTOR WIRING.** The motor wiring shown in these diagrams is current at the time of printing but may not match your machine. If you find this to be the case, use the wiring diagram inside the motor junction box.















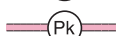
**CAPACITORS/INVERTERS.** Some capacitors and power inverters store an electrical charge for up to 10 minutes after being disconnected from the power source. To reduce the risk of being shocked, wait at least this long before working on capacitors.

**EXPERIENCING DIFFICULTIES.** If you are experiencing difficulties understanding the information included in this section, contact our Technical Support at (570) 546-9663.

#### NOTICE

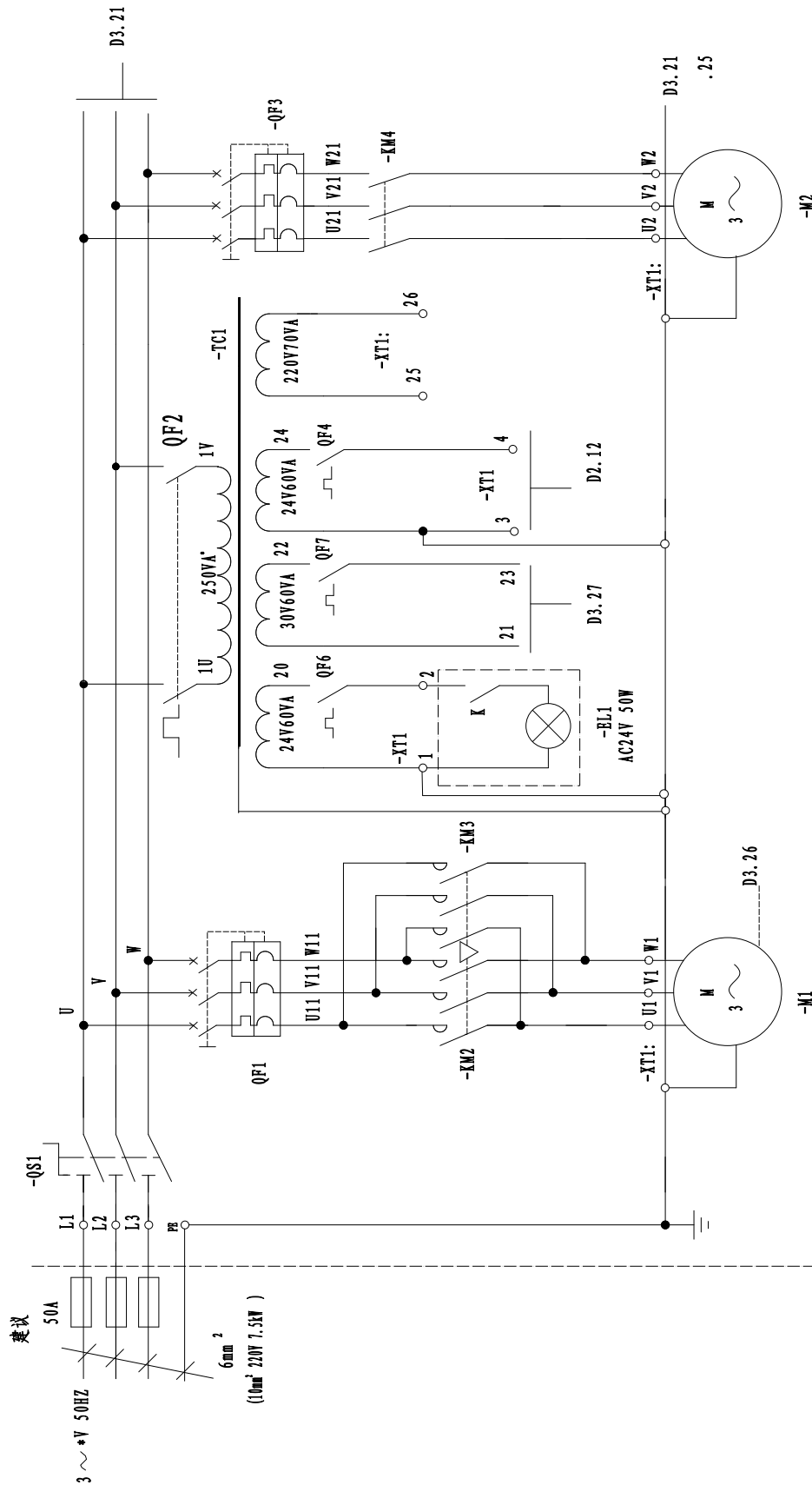
The photos and diagrams included in this section are best viewed in color. You can view these pages in color at [www.grizzly.com](http://www.grizzly.com).

#### COLOR KEY

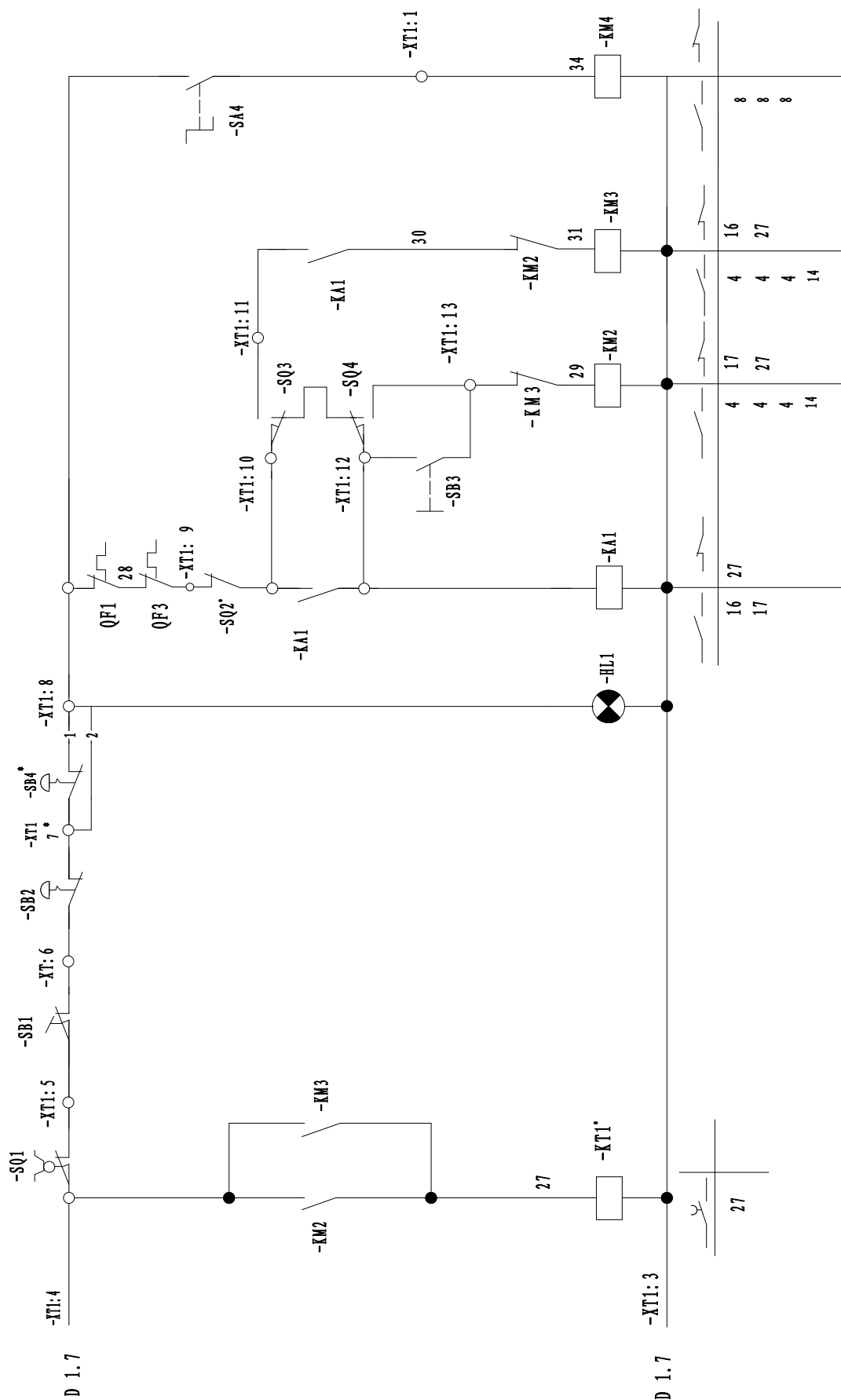
BLACK		BLUE		YELLOW		LIGHT BLUE	
WHITE		BROWN		YELLOW GREEN		BLUE WHITE	
GREEN		GRAY		PURPLE		TURQUOISE	
RED		ORANGE		PINK			



# Electrical Cabinet & Motors



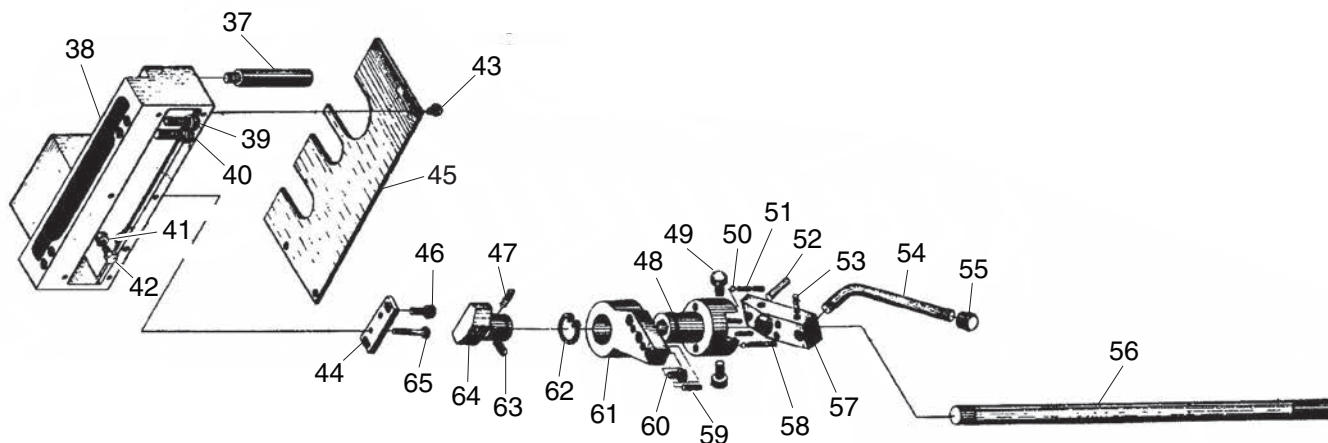
## Circuit Diagram



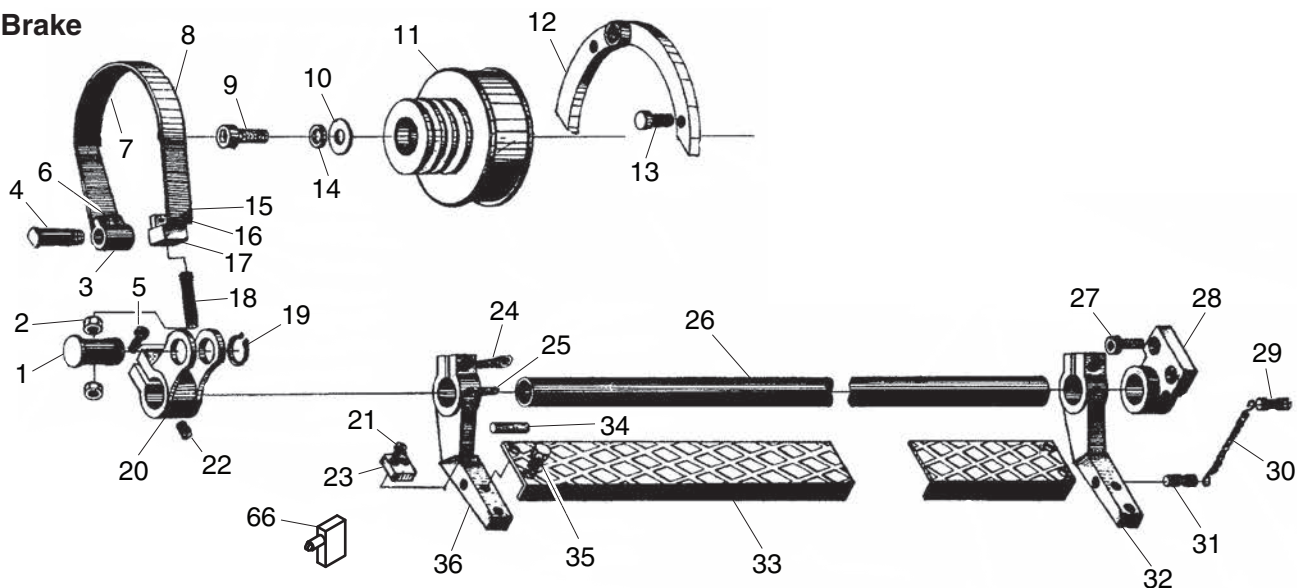
# SECTION 9: PARTS

## Control Rod & Brake

### Control Rod



### Brake



**Please Note:** We do our best to stock replacement parts whenever possible, but we cannot guarantee that all parts shown here are available for purchase. Call (800) 523-4777 or visit our online parts store at [www.grizzly.com](http://www.grizzly.com) to check for availability.





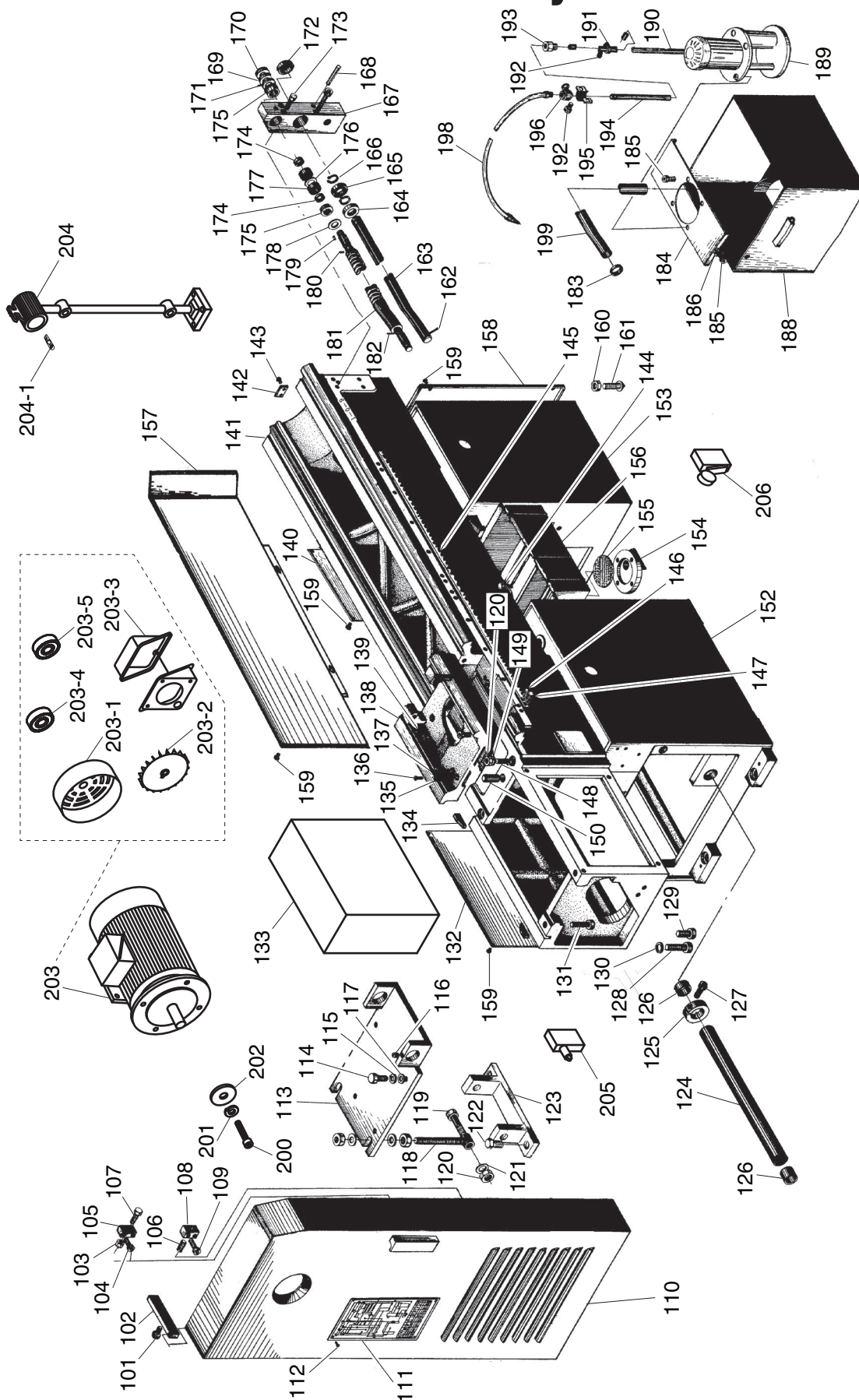
# Control Rod & Brake Parts List

REF	PART #	DESCRIPTION
1	P07460001	CAPTIVE PIVOT PIN
2	PN09M	HEX NUT M12-1.75
3	P07460003	BRAKE BELT PIVOT SLEEVE
4	P07460004	SHAFT
5	PCAP64M	CAP SCREW M10-1.5 X 25
6	PRIV020M	RIVET 6 X 25MM DOME HEAD
7	P07460007	ASBESTOS BRAKE BELT
8	P07460008	STEEL BRAKE BELT
9	PCAP77M	CAP SCREW M12-1.75 X 30
10	P07460010	BRAKE DRUM FLAT WASHER 12MM
11	P07460011	BRAKE DRUM-MOTOR PULLEY
12	P07460012	BRAKE BELT SUPPORT RING
13	PB15M	HEX BOLT M8-1.25 X 40
14	PLW05M	LOCK WASHER 12MM
15	PRIV021M	RIVET 12 X 20MM DOME HEAD
16	P07460016	RIVET FLAT WASHER 12MM
17	P07460017	BRAKE BELT END BLOCK
18	P07460018	STUD-UDE M12-1.75 X 130 30,70
19	PR15M	EXT RETAINING RING 30MM
20	P07460020	BRAKE BELT BRACKET
21	PCAP33M	CAP SCREW M5-.8 X 12
22	PSS135M	SET SCREW M12-1.75 X 12 CONE-PT
23	P07460023	STOP BLOCK
24	PCAP64M	CAP SCREW M10-1.5 X 25
25	PSS136M	SET SCREW M8-1.25 X 12 CONE-PT
26	P07460026	BRAKE PEDAL PIVOT SHAFT (G0746)
26	P07490026	BRAKE PEDAL PIVOT SHAFT (G0749)
27	PCAP92M	CAP SCREW M12-1.75 X 40
28	P07460028	PIVOT SHAFT BRACKET
29	P07460029	FIXED SPRING SHAFT
30	P07460030	EXTENSION SPRING
31	P07460031	MOVABLE SPRING SHAFT
32	P07460032	RIGHT BRAKE PEDAL LEVER
33	P07460033	BRAKE PEDAL (G0746)
33	P07490033	BRAKE PEDAL (G0749)

REF	PART #	DESCRIPTION
34	P07460034	DOWEL PIN 12 X 25
35	PB06M	HEX BOLT M8-1.25 X 12
36	P07460036	LEFT BRAKE PEDAL LEVER
37	P07460037	SHOULDER BOLT M8-1.25 X 119
38	P07460038	SPINDLE SWITCH HOUSING
39	PCAP37M	CAP SCREW M6-1 X 50
40	P07460040	INT THREADED TAPERED PIN 8 X 50
41	PN01M	HEX NUT M6-1
42	PB29M	HEX BOLT M6-1 X 30
43	PS14M	PHLP HD SCR M6-1 X 12
44	P07460044	STOP PLATE
45	P07460045	SPINDLE SWITCH ACCESS PANEL
46	PS78M	PHLP HD SCR M4-.7 X 45
47	PSS137M	SET SCREW M6-1 X 12 LONG DOG-PT
48	P07460048	SPINDLE LEVER HUB
49	P07460049	PAN HEAD SCREW W/DOG-PT M8-1.25 X 10 X 6
50	PSTB002M	STEEL BALL 8MM
51	P07460051	COMPRESSION SPRING 1 X 6 X 8
52	P07460052	DOWEL PIN 8 X 38
53	PRP91M	ROLL PIN 5 X 35
54	P07460054	SPINDLE LEVER
55	P07460055	TAPERED KNOB M12-1.75 X 40
56	P07460056	CONTROL ROD (G0746)
56	P07490056	CONTROL ROD (G0749)
57	P07460057	SPINDLE LEVER PIVOT BLOCK
58	PSS30M	SET SCREW M10-1.5 X 10
59	P07460059	TAPERED PIN 6 X 30
60	PCAP07M	CAP SCREW M6-1 X 30
61	P07460061	SPINDLE LEVER BRACKET
62	PR12M	EXT RETAINING RING 35MM
63	PRP05M	ROLL PIN 5 X 30
64	P07460064	CONTROL ROD CAM
65	PCAP01M	CAP SCREW M6-1 X 16
66	P07460066	LIMIT SWITCH SUNWORLD JLXK1-411



# Bed & Body



# G0746-49 Bed & Body Parts List

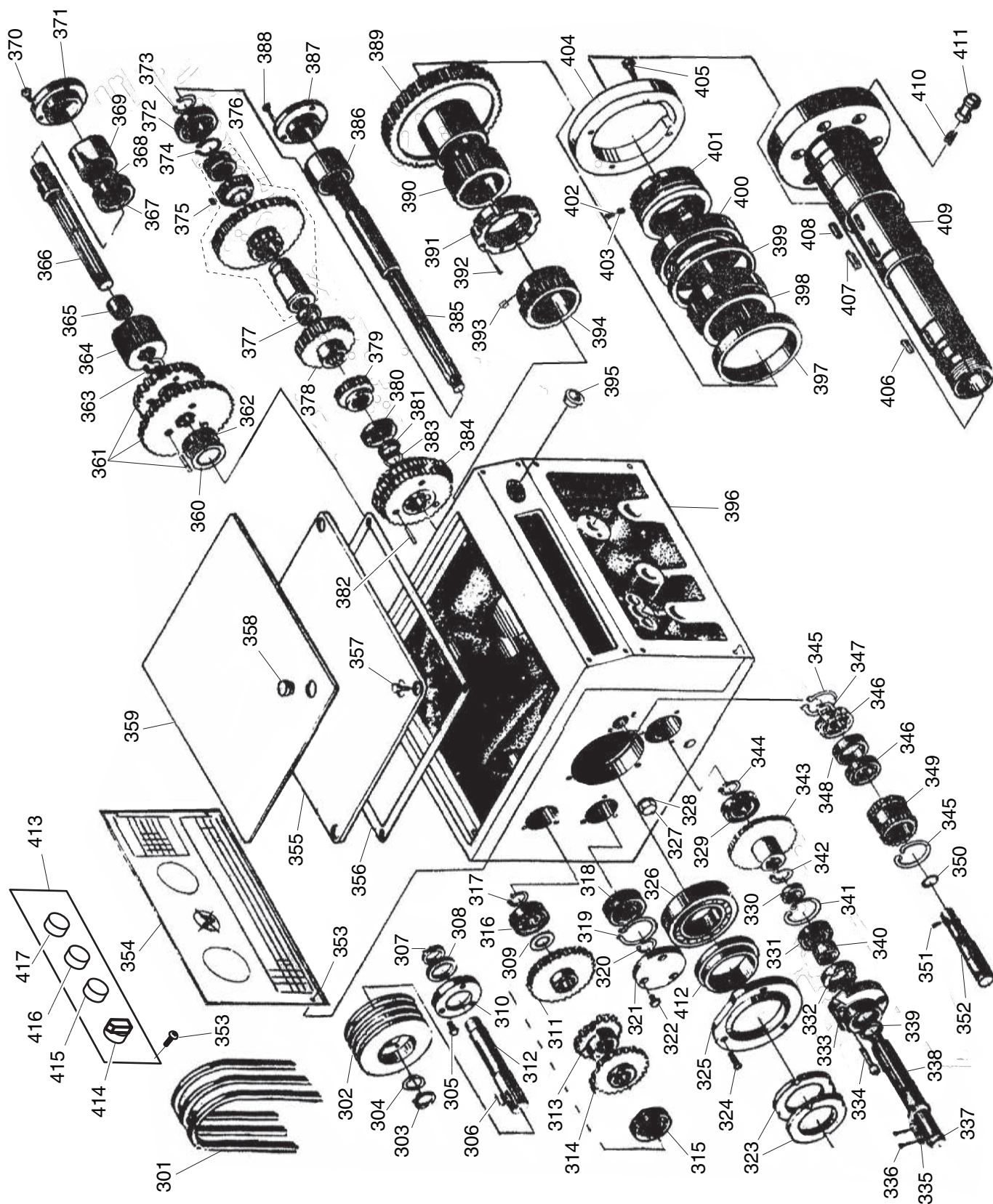
REF	PART #	DESCRIPTION
101	PB07M	HEX BOLT M8-1.25 X 25
102	P07460102	HINGE
103	PLN04M	LOCK NUT M8-1.25
104	PCAP06M	CAP SCREW M6-1 X 25
105	P07460105	HINGE BRACKET
106	P07460106	COMPRESSION SPRING
107	PCAP40M	CAP SCREW M8-1.25 X 35
108	P07460108	DOOR LATCH
109	PCAP48M	CAP SCREW M6-1 X 35
110	P07460110	END GEAR DOOR (G0746)
110	P07490110	END GEAR DOOR (G0749)
111	P07460111	LUBRICATION INFORMATION PLATE
112	PRIV009M	RIVET 2 X 6MM STEEL FLUTED
113	P07460113	MOTOR MOUNT
114	PB14M	HEX BOLT M10-1.5 X 35
115	PLG06M	LOCK WASHER 10MM
116	PSS14M	SET SCREW M8-1.25 X 12
117	PW04M	FLAT WASHER 10MM
118	P07460118	MOTOR MOUNT THREADED PIVOT ROD
119	PB165M	HEX BOLT M16-2 X 60
120	PN13M	HEX NUT M16-2
121	PW08M	FLAT WASHER 16MM
122	PCAP205M	CAP SCREW M16-2 X 35
123	P07460123	MOTOR MOUNT BRACKET
124	P07460124	MOTOR MOUNT AXLE
125	P07460125	LOCK COLLAR
126	P07460126	BUSHING
127	PCAP13M	CAP SCREW M8-1.25 X 30
128	PCAP104M	CAP SCREW M16-2 X 65
129	PCAP54M	CAP SCREW M16-2 X 40
130	PLW10M	LOCK WASHER 16MM
131	PCAP63M	CAP SCREW M12-1.75 X 60
132	P07460132	MOTOR ACCESS PANEL
133	P07460133	ELECTRICAL CABINET BOX W/DOOR
134	P07460134	CASTING PLUG
135	P07460135	INT THREADED GAP TAPERED PIN
136	PSS16M	SET SCREW M8-1.25 X 10
137	PCAP131M	CAP SCREW M12-1.75 X 45
138	P07460138	GAP CASTING (G0746)
138	P07490138	GAP CASTING (G0749)
139	PB09M	HEX BOLT M8-1.25 X 20
140	P07460140	COOLANT TANK REAR ACCESS PANEL
141	P07460141	BED (G0746)
141	P07490141	BED (G0749)
142	P07460142	BED END STOP PLATE
143	PFH29M	FLAT HD SCR M6-1 X 10
144	PSS04M	SET SCREW M6-1 X 12
145	P07460145	RACK (G0746)
145	P07490145	RACK (G0749)
146	PRP90M	ROLL PIN 8 X 30
147	PCAP14M	CAP SCREW M8-1.25 X 20
148	P07460148	STUD-FT M16-2 X 90
149	PW08M	FLAT WASHER 16MM
150	P07460150	PIVOT ROD
152	P07460152	LEFT STAND CASTING
153	P07460153	RIGHT STAND CASTING
154	P07460154	DRAIN SCREEN MOUNTING RING

REF	PART #	DESCRIPTION
155	P07460155	DRAIN SCREEN
156	P07460156	CHIP TRAY (G0746)
156	P07490156	CHIP TRAY (G0749)
157	P07460157	SPLASH PAN (G0746)
157	P07490157	SPLASH PAN (G0749)
158	P07460158	COOLANT TANK SIDE ACCESS PANEL
159	PS14M	PHLP HD SCR M6-1 X 12
160	PN48M	HEX NUT M16-2 THIN
161	P07460161	LEVELING BOLT
162	PRP102M	ROLL PIN 4 X 36
163	P07460163	FEED ROD (G0746)
163	P07490163	FEED ROD (G0749)
164	P07460164	SPACER
165	P6005ZZ	BALL BEARING 6005ZZ
166	PR11M	EXT RETAINING RING 25MM
167	P07460167	SHAFT END BRACKET
168	P07460168	INT THREADED TAPERED PIN 8 X 40
169	P07460169	LOCK RING W/SIDE HOLE
170	P07460170	SPANNER NUT M16-1.5
171	PRP61M	ROLL PIN 3 X 12
172	P07460172	FEED ROD END PLUG
173	PCAP188M	CAP SCREW M10-1.5 X 80
174	P07460174	SPACER
175	P07460175	BUSHING
176	P07460176	SPACER
177	P07460177	NEEDLE ROLLER BEARING NAF 20 X 35 X 17
178	P07460178	SPACER
179	PK149M	KEY 8 X 8 X 25
180	PRP14M	ROLL PIN 3 X 6
181	P07460181	LONGITUDINAL LEADSCREW (G0746)
181	P07490181	LONGITUDINAL LEADSCREW (G0749)
182	PRP90M	ROLL PIN 8 X 30
183	P07460183	HOSE CLAMP 32MM
184	P07460184	COOLANT TANK TOP COVER
185	PCAP01M	CAP SCREW M6-1 X 16
186	PN01M	HEX NUT M6-1
188	P07460188	COOLANT TANK
189	P07460189	COOLANT PUMP 1/8HP 220V 3-PH
190	P07460190	TUBE SUPPORT M22-1.5, STEEL MESH
191	P07460191	COOLANT TUBE CLAMP DIN 72571 1 X 2
192	PCAP04M	CAP SCREW M6-1 X 10
193	P07460193	COOLANT TUBE COUPLER
194	P07460194	COOLANT TUBE
195	P07460195	COOLANT TUBE CLAMP, U-SHAPED
196	P07460196	COOLANT VALVE 3/8" NPT
198	P07460198	COOLANT NOZZLE 3/8" NPT
199	P07460199	PLASTIC TUBE 25 X 3 X 1000MM
200	PCAP92M	CAP SCREW M12-1.75 X 40
201	PLW05M	LOCK WASHER 12MM
202	P07460202	MOTOR PULLEY FLAT WASHER 12MM
203	P07460203	MOTOR 10HP 220V 3-PH
203-1	P07460203-1	MOTOR FAN COVER
203-2	P07460203-2	MOTOR FAN
203-3	P07460203-3	MOTOR JUNCTION BOX
203-4	P6308ZZ	BALL BEARING 6308ZZ
204	P07460204	HALOGEN WORK LIGHT ASSEMBLY
204-1	PBULB6	HALOGEN BULB 24V 2-PRONG





# Headstock Gears



# Headstock Gears Parts List

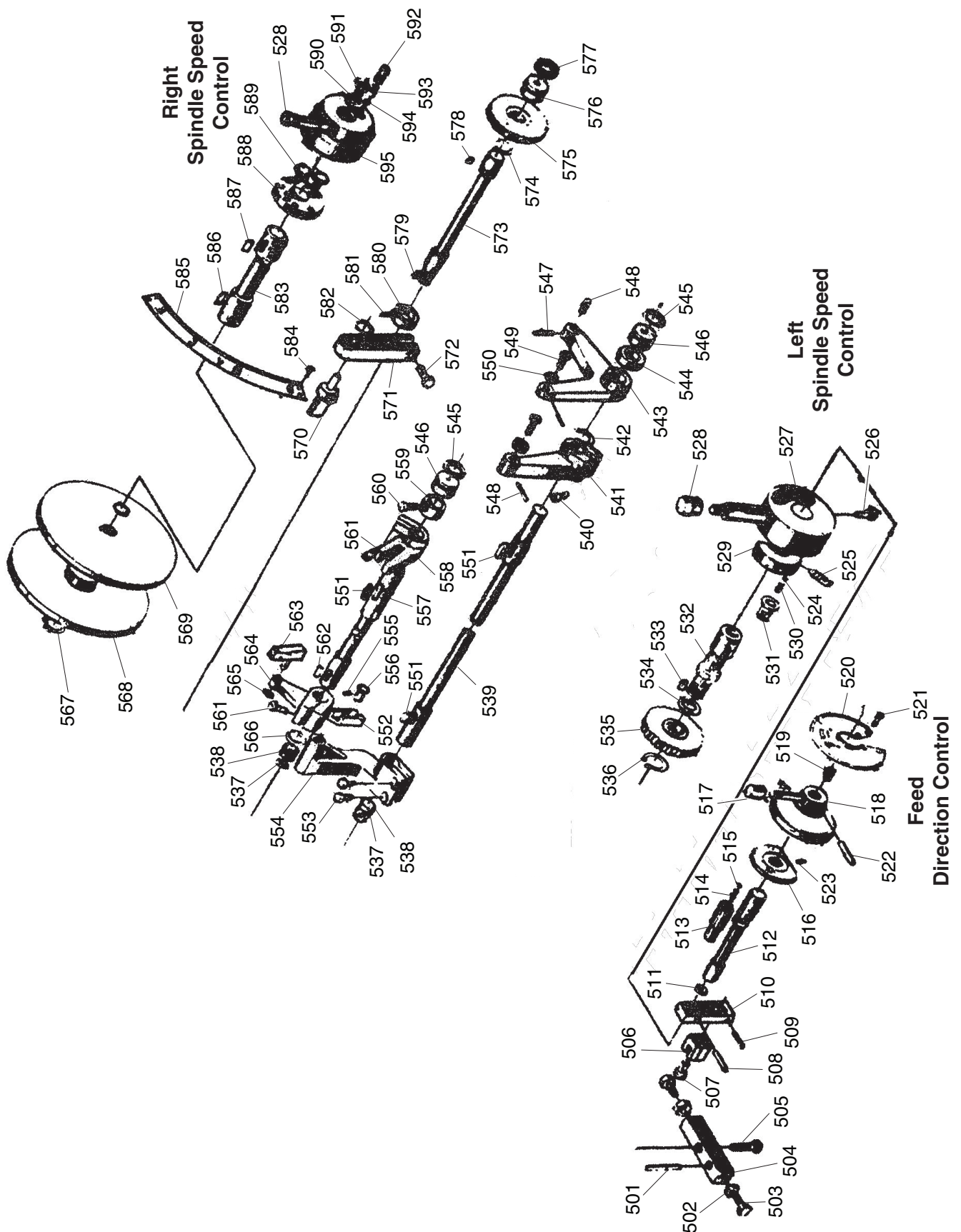
REF	PART #	DESCRIPTION
301	PVA89.5	V-BELT A89.5 (G0746)
301	PVA85	V-BELT A85 (G0749)
302	P07460302	SPINDLE PULLEY
303	P07460303	SPANNER NUT M30-1.5
304	P07460304	TABBED LOCK WASHER 30MM
305	PCAP155M	CAP SCREW M8-1.25 X 14
306	PK138M	KEY 10 X 10 X 36
307	P6021-OPEN	BALL BEARING 6021-OPEN
308	P07460308	OIL SEAL A40 X 55 X 7MM
309	P07460309	THRUST WASHER
310	P07460310	END FLANGE
311	P07460311	GEAR 42T
312	P07460312	SPLINE SHAFT
313	P07460313	GEAR 29T
314	P07460314	GEAR 35T
315	P6206-OPEN	BALL BEARING 6206-OPEN
316	P6305-OPEN	BALL BEARING 6305-OPEN
317	PR11M	EXT RETAINING RING 25MM
318	P6305-OPEN	BALL BEARING 6305-OPEN
319	PR13M	EXT RETAINING RING 65MM
320	PR11M	EXT RETAINING RING 25MM
321	P07460321	END CAP
322	PCAP27M	CAP SCREW M6-1 X 14
323	P07460323	SPANNER NUT 95MM
324	PCAP27M	CAP SCREW M6-1 X 14
325	P07460325	BEARING RETAINING RING
326	P07460326	TAPERED ROLLER BEARING 95 X 145 X 37
327	P07460327	HEADSTOCK OIL DRAIN PLUG M30-1.5
328	P07460328	O-RING 30 X 1.5
329	P6305-OPEN	BALL BEARING 6305-OPEN
330	P07460330	SPACER
331	P6206-OPEN	BALL BEARING 6206-OPEN
332	P07460332	SPACER
333	P07460333	BEARING FLANGE
334	PCAP27M	CAP SCREW M6-1 X 14
335	P07460335	KEY 8 X 8 X 63 W/2 HOLES
336	PCAP80M	CAP SCREW M3-.5 X 8
337	PR15M	EXT RETAINING RING 30MM
338	P07460338	OUTPUT SHAFT
339	P07460308	OIL SEAL 40 X 55 X 7MM
340	P07460340	BUSHING
341	PR38M	INT RETAINING RING 62MM
342	PR15M	EXT RETAINING RING 30MM
343	P07460343	GEAR 59T
344	PR11M	EXT RETAINING RING 25MM
345	PR25M	INT RETAINING RING 47MM
346	P6005-OPEN	BALL BEARING 6005-OPEN
347	PR11M	EXT RETAINING RING 25MM
348	P07460348	SPACER
349	P07460349	GEAR 35T
350	PORG030	O-RING 3.1 X 29.4 G30
351	PSS138M	SET SCREW M8-1.25 X 16 CONE-PT
352	P07460352	SHAFT
353	PS07M	PHLP HD SCR M4-.7 X 8
354	P07460354	HEADSTOCK FRONT COVER (G0746)
354	P07490354	HEADSTOCK FRONT COVER (G0749)
355	P07460355	HEADSTOCK TOP COVER RUBBER PAD
356	P07460356	HEADSTOCK TOP COVER GASKET
357	PCAP27M	CAP SCREW M6-1 X 14
358	P07460358	HEADSTOCK OIL FILL PLUG 3/4" NPT

REF	PART #	DESCRIPTION
359	P07460359	HEADSTOCK TOP COVER
360	P07460360	CHECK RING 8 X 62MM
361	P07460361	COMBO GEAR W/PIN 61T/46T 10 X 32MM
362	P6305-OPEN	BALL BEARING 6305-OPEN
363	PR12M	EXT RETAINING RING 35MM
364	P07460364	GEAR 25T
365	P07460365	BUSHING
366	P07460366	SPLINE SHAFT
367	P6306-OPEN	BALL BEARING 6306-OPEN
368	PR15M	EXT RETAINING RING 30MM
369	P07460369	BUSHING
370	PCAP155M	CAP SCREW M8-1.25 X 14
371	P07460371	BEARING FLANGE
372	P6306-OPEN	BALL BEARING 6306-OPEN
373	PR15M	EXT RETAINING RING 30MM
374	PR62M	EXT RETAINING RING 42MM
375	P07460375	KEY 8 X 5 X 28
376	P07460376	COMBO GEAR 57T/36T W/SHAFT ASSEMBLY
377	P07460377	BUSHING
378	P07460378	GEAR 36T
379	P07460379	GEAR 21T
380	P6206-OPEN	BALL BEARING 6206-OPEN
381	P07460381	THRUST WASHER 30MM
382	P07460382	HEADLESS RIVET 10 X 45
383	PR15M	EXT RETAINING RING 30MM
384	P07460384	COMBO GEAR 46T/40T/52T
385	P07460385	SPLINE SHAFT
386	P07460386	BUSHING
387	P07460387	END FLANGE
388	PCAP27M	CAP SCREW M6-1 X 14
389	P07460389	GEAR 65T
390	P07460390	GEAR 39T
391	P07460391	SPANNER NUT
392	PCAP02M	CAP SCREW M6-1 X 20
393	PSS130M	SET SCREW M6-1 X 8 CONE-PT
394	P07460394	GEAR 59T
395	P07460395	OIL SIGHT GLASS M20-2.5
396	P07460396	HEADSTOCK HOUSING (G0746)
396	P07490396	HEADSTOCK HOUSING (G0749)
397	P07460397	SPACER
398	P07460398	2-ROW ANG CONT THRUST BEARING 234421 B/P5
399	P07460399	SPACER
400	P6022-OPEN	BALL BEARING 6022-OPEN
401	P07460401	OIL RING
402	PSS16M	SET SCREW M8-1.25 X 10
403	P07460403	PLUNGER
404	P07460404	FLANGE RING
405	PCAP13M	CAP SCREW M8-1.25 X 30
406	P07460406	KEY 16 X 7 X 50
407	P07460406	KEY 16 X 7 X 50
408	P07460408	KEY 16 X 7 X 63
409	P07460409	SPINDLE D1-8 CAMLOCK
410	P07460410	COMPRESSION SPRING 1.4 X 10.4 X 22MM
411	P07460411	CAMLOCK
412	P07460412	FLANGED OIL SEAL
413	P07460413	CONTROL PANEL PLATE
414	P07460414	COOLANT SWITCH SANLICO LA68C-AK10
415	P07460415	E-STOP BUTTON SANLICO LA68C-BK01
416	P07460416	POWER LAMP SANLICO AD58B-22D
417	P07460417	JOG BUTTON SANLICO LA68C-AK10





# Headstock Controls



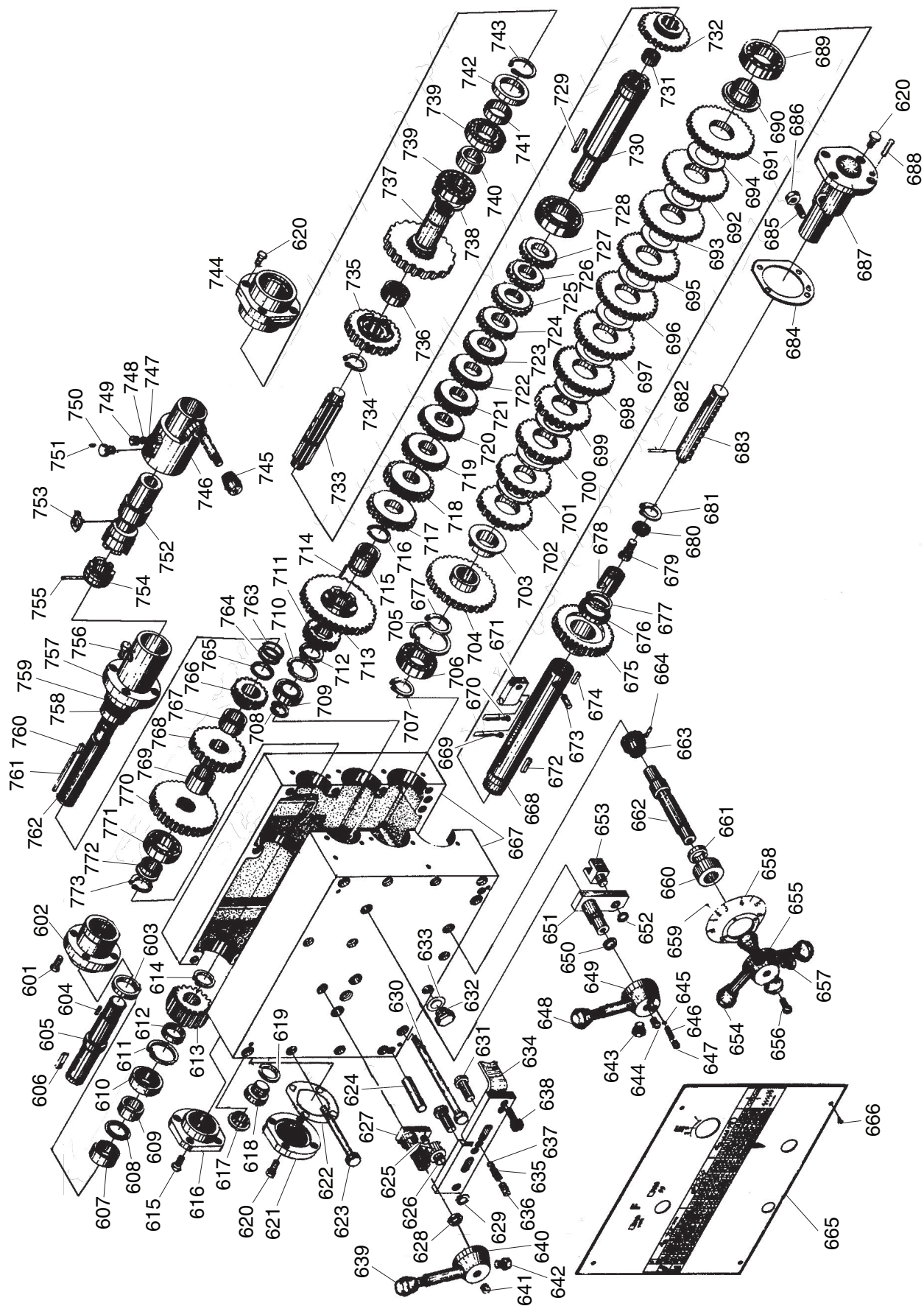
# Headstock Controls Parts List

REF	PART #	DESCRIPTION
501	P07460501	DOWEL PIN 6 X 40
502	PN03M	HEX NUT M8-1.25
503	PB09M	HEX BOLT M8-1.25 X 20
504	P07460504	ADJUSTMENT BLOCK W/2 HOLES
505	PB20M	HEX BOLT M8-1.25 X 35
506	P07460506	PIVOT SHAFT
507	P07460507	SHIFT FORK
508	PRP42M	ROLL PIN 3 X 20
509	PRP08M	ROLL PIN 6 X 30
510	P07460510	FORK PIVOT BLOCK
511	P07460511	O-RING 12.42 X 1.78
512	P07460512	SHAFT
513	P07460513	LOCATOR PIN
514	P07460514	COMPRESSION SPRING 1 X 5 X 20
515	PSTB003M	STEEL BALL 6MM
516	P07460516	LOCATOR FLANGE
517	P07460517	TAPERED KNOB M8-1.25 X 25
518	P07460518	FEED DIRECTION HUB/HANDLE
519	PSS15M	SET SCREW M12-1.75 X 12
520	P07460520	FEED DIRECTION LABEL PLATE
521	PRIV009M	RIVET 2 X 6MM STEEL FLUTED
522	PRP33M	ROLL PIN 6 X 50
523	PSS09M	SET SCREW M8-1.25 X 20
524	PSTB005M	STEEL BALL 10MM
525	PSS09M	SET SCREW M8-1.25 X 20
526	PCAP31M	CAP SCREW M8-1.25 X 25
527	P07460527	LEFT SPINDLE SPEED HUB/LEVER
528	P07460528	TAPERED KNOB M10-1.5 X 25
529	P07460529	LOCATOR FLANGE
530	P07460530	COMPRESSION SPRING
531	P07460531	LOCATOR PIN
532	P07460532	SHAFT
533	PK147M	KEY 6 X 6 X 18
534	P07460534	O-RING 26.17 X 1.78
535	P07460535	GEAR 42T
536	PR11M	EXT RETAINING RING 25MM
537	PORP018	O-RING 17.8 X 2.4 P18
538	P07460538	PLUG
539	P07460539	SHAFT
540	PCAP13M	CAP SCREW M8-1.25 X 30
541	P07460541	MIDDLE PIVOT ARM
542	PR09M	EXT RETAINING RING 20MM
543	P07460543	OUTER PIVOT ARM
544	P07460544	SPACER
545	PORG030	O-RING 3.1 X 29.4 G30
546	P07460546	PLUG
547	P07460547	DOWEL PIN 10 X 28
548	PRP42M	ROLL PIN 3 X 20

REF	PART #	DESCRIPTION
549	P07460549	HEADED PIVOT PIN
550	P07460550	SLEEVE
551	PK42M	KEY 6 X 6 X 30
552	P07460552	FORK PIVOT BLOCK
553	PCAP14M	CAP SCREW M8-1.25 X 20
554	P07460554	INNER FORK PIVOT ARM
555	PRP42M	ROLL PIN 3 X 20
556	P07460556	FORK SHAFT
557	P07460557	SHAFT
558	P07460558	OUTER FORK PIVOT ARM
559	P07460559	LOCK COLLAR
560	PCAP02M	CAP SCREW M6-1 X 20
561	PCAP31M	CAP SCREW M8-1.25 X 25
562	PK32M	KEY 6 X 6 X 28
563	P07460563	FORK PIVOT BLOCK
564	P07460564	INNER FORK PIVOT ARM
565	PR01M	EXT RETAINING RING 10MM
566	P07460566	SPACER
567	PR09M	EXT RETAINING RING 20MM
568	P07460568	INNER CAM
569	P07460569	OUTER CAM
570	P07460570	SHIFT FORK
571	P07460571	FORK PIVOT BLOCK
572	PCAP14M	CAP SCREW M8-1.25 X 20
573	P07460573	SHAFT
574	PR09M	EXT RETAINING RING 20MM
575	P07460575	GEAR 42T
576	P07460576	PLUG
577	PORG030	O-RING 3.1 X 29.4 G30
578	PK147M	KEY 6 X 6 X 18
579	PK147M	KEY 6 X 6 X 18
580	P07460580	BUSHING
581	PSS130M	SET SCREW M6-1 X 8 CONE-PT
582	PR03M	EXT RETAINING RING 12MM
583	P07460583	SHAFT
584	PRIV009M	RIVET 2 X 6MM STEEL FLUTED
585	P07460585	RIGHT SHIFT LEVER INDICATOR PLATE
586	PK44M	KEY 6 X 6 X 50
587	PK07M	KEY 6 X 6 X 20
588	P07460588	LOCATOR FLANGE
589	PCAP27M	CAP SCREW M6-1 X 14
590	P07460590	HUB/LEVER FLAT WASHER 12MM
591	P07460591	WIDE HEAD SCREW M8-1.25 X 12
592	PSS15M	SET SCREW M12-1.75 X 12
593	P07460593	COMPRESSION SPRING
594	PSTB005M	STEEL BALL 10MM
595	P07460595	RIGHT SPINDLE SPEED HUB/LEVER



# Quick-Change Gearbox



# Quick-Change Gearbox Parts List

REF	PART #	DESCRIPTION
601	PCAP01M	CAP SCREW M6-1 X 16
602	P07460602	BEARING FLANGE
603	P07460603	BUSHING SEAL
604	P07460604	KEY 8 X 5 X 25
605	P07460605	DRIVE SHAFT
606	P07460606	KEY 8 X 8 X 63 W/HOLES
607	P07460607	NEEDLE ROLLER BEARING NAF 30 X 45 X 17
608	P07460608	THRUST WASHER
609	P07460609	SPACER
610	P6006-OPEN	BALL BEARING 6006-OPEN
611	PR51M	INT RETAINING RING 55MM
612	P07460612	SPACER
613	P07460613	GEAR 36T
614	PR11M	EXT RETAINING RING 25MM
615	PCAP01M	CAP SCREW M6-1 X 16
616	P07460616	BEARING FLANGE
617	P07460617	OIL SIGHT GLASS M27-1.5
618	P07460618	GEARBOX OIL FILL PLUG 3/4" NPT
619	P07460619	FILL PLUG FLAT WASHER 27MM
620	PCAP26M	CAP SCREW M6-1 X 12
621	P07460621	BEARING COVER
622	P07460622	GASKET
623	PCAP206M	CAP SCREW M8-1.25 X 110
624	P07460624	INT THREADED TAPERED PIN 10 X 50
625	P07460625	DOWEL PIN 6 X 18
626	P07460626	FORK PIVOT ROLLER
627	P07460627	FORK PIVOT BRACKET
628	P07460628	O-RING 20MM
629	PR03M	EXT RETAINING RING 12MM
630	PCAP207M	CAP SCREW M10-1.5 X 180
631	P07460631	HEADED PIN 10 X 37
632	P07460632	OIL DRAIN PLUG 1/4" NPT
633	P07460633	DRAIN PLUG FLAT WASHER 14MM
634	P07460634	L-BRACKET
635	P07460635	COMPRESSION SPRING
636	PSS13M	SET SCREW M10-1.5 X 12
637	PSTB002M	STEEL BALL 8MM
638	PRIV022M	RIVET 5 X 18MM DOME HEAD
639	P07460639	TAPERED KNOB M10-1.5 X 32
640	P07460640	GEARBOX LEFT HUB/LEVER
641	PSS16M	SET SCREW M8-1.25 X 10
642	PCAP11M	CAP SCREW M8-1.25 X 16
643	PCAP58M	CAP SCREW M8-1.25 X 12
644	PSS16M	SET SCREW M8-1.25 X 10
645	PSTB002M	STEEL BALL 8MM
646	P07460646	COMPRESSION SPRING
647	PSS13M	SET SCREW M10-1.5 X 12
648	P07460639	TAPERED KNOB M10-1.5 X 32
649	P07460649	GEARBOX RIGHT HUB/LEVER
650	P07460628	O-RING 20MM
651	P07460651	FORK PIVOT BRACKET
652	PR03M	EXT RETAINING RING 12MM
653	P07460653	SHIFT FORK

REF	PART #	DESCRIPTION
654	P07460639	TAPERED KNOB M10-1.5 X 32
655	P07460655	GEARBOX LOWER HUB/LEVER
656	PSS16M	SET SCREW M8-1.25 X 10
657	PCAP11M	CAP SCREW M8-1.25 X 16
658	P07460658	HUB/LEVER INDICATOR RING
659	PRIV009M	RIVET 2 X 6MM STEEL FLUTED
660	P07460660	SLEEVE
661	P07460661	BUSHING SEAL
662	P07460662	SHAFT
663	P07460663	GEAR 21T
664	PRP49M	ROLL PIN 5 X 25
665	P07460665	GEARBOX FRONT COVER
666	PRIV009M	RIVET 2 X 6MM STEEL FLUTED
667	P07460667	GEARBOX HOUSING 2-PC
668	P07460668	SLIDE KEY SHAFT
669	P07460669	COMPRESSION SPRING
670	P07460670	SPRING SUPPORT PIN
671	P07460671	SLIDE KEY
672	P07460672	KEY 8 X 5 X 30
673	PRP71M	ROLL PIN 6 X 22
674	P07460604	KEY 8 X 5 X 25
675	P07460675	GEAR 49T
676	P07460676	SPACER
677	PR68M	EXT RETAINING RING 40MM
678	P07460678	SHAFT SUPPORT
679	P07460679	HEADED CONNECTOR SHAFT
680	P609-OPEN	BALL BEARING 609-OPEN
681	PR93M	INT RETAINING RING 24MM
682	PRP64M	ROLL PIN 3 X 18
683	P07460683	RACK SHAFT
684	P07460684	GASKET
685	PSS21M	SET SCREW M8-1.25 X 25
686	PN03M	HEX NUT M8-1.25
687	P07460687	BEARING FLANGE
688	PRP112M	ROLL PIN 6 X 18
689	P6009-OPEN	BALL BEARING 6009-OPEN
690	P07460690	FLANGED SLEEVE
691	P07460691	GEAR 56T
692	P07460692	GEAR 48T
693	P07460693	GEAR 32T
694	P07460694	SPACER
695	P07460695	GEAR 28T
696	P07460696	GEAR 32T
697	P07460697	GEAR 32T
698	P07460698	GEAR 32T
699	P07460699	GEAR 40T
700	P07460700	GEAR 40T
701	P07460701	GEAR 32T
702	P07460702	GEAR 40T
703	P07460703	FLANGED SLEEVE
704	P07460704	GEAR 34T
705	PR38M	INT RETAINING RING 62MM
706	P6007-OPEN	BALL BEARING 6007-OPEN





# Quick-Change Gearbox Parts List (Cont.)

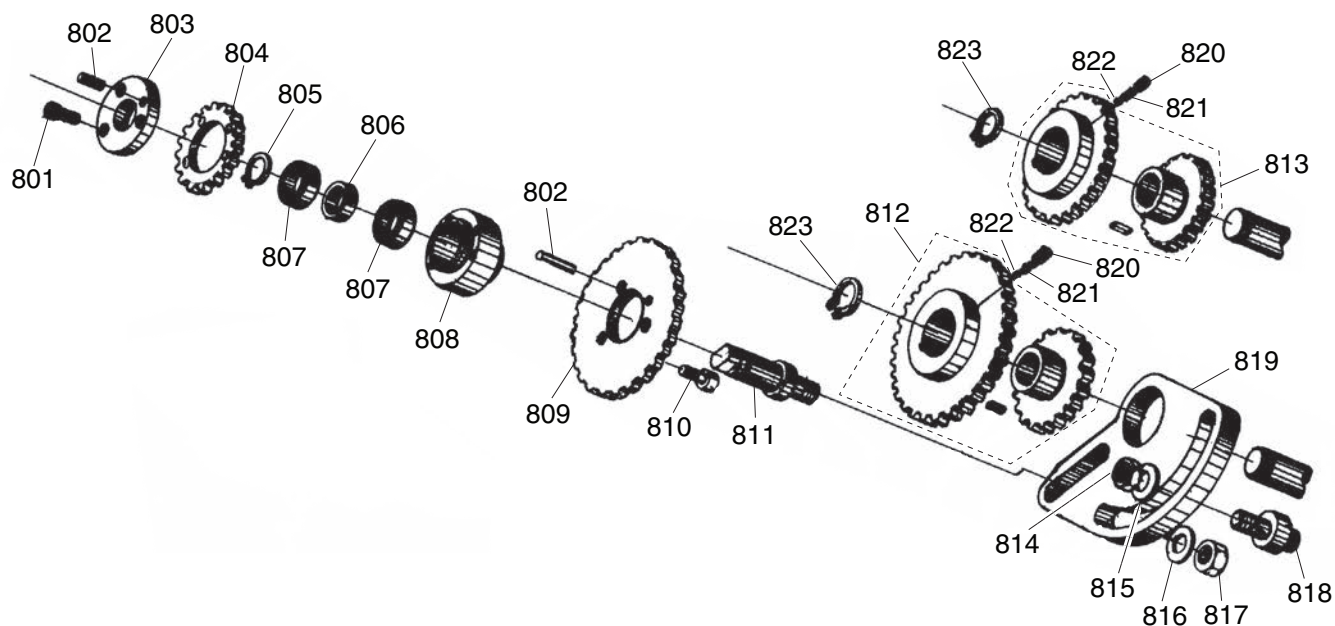
REF	PART #	DESCRIPTION
707	PR12M	EXT RETAINING RING 35MM
708	PR11M	EXT RETAINING RING 25MM
709	P6005-OPEN	BALL BEARING 6005-OPEN
710	PR25M	INT RETAINING RING 47MM
711	P07460711	GEAR 27T
712	PR84M	EXT RETAINING RING 34MM
713	P07460713	CLUTCH GEAR 32T
714	P07460714	DOWEL PIN 6 X 20
715	P07460715	SLEEVE
716	PR37M	EXT RETAINING RING 32MM
717	P07460717	GEAR 35T
718	P07460718	GEAR 27T
719	P07460719	GEAR 30T
720	P07460720	GEAR 30T
721	P07460721	GEAR 23T
722	P07460722	GEAR 22T
723	P07460723	GEAR 21T
724	P07460724	GEAR 30T
725	P07460725	GEAR 19T
726	P07460726	GEAR 27T
727	P07460727	GEAR 29T
728	P6009-OPEN	BALL BEARING 6009-OPEN
729	PK185M	KEY 10 X 10 X 65
730	P07460730	SHAFT
731	P07460731	NEEDLE ROLLER BEARING NAF 17 X 25 X 3
732	P07460732	SLIDE GEAR 35T
733	P07460733	SPLINE SHAFT
734	PR19M	EXT RETAINING RING 28MM
735	P07460735	COMBO SLIDE GEAR 30T/45T
736	P6004-OPEN	BALL BEARING 6004-OPEN
737	P07460737	GEAR SHAFT 60T
738	PR38M	INT RETAINING RING 62MM
739	P6007-OPEN	BALL BEARING 6007-OPEN
740	P07460740	SPACER

REF	PART #	DESCRIPTION
741	P07460741	SPACER
742	P07460742	OIL SEAL
743	PR21M	INT RETAINING RING 35MM
744	P07460744	BEARING HOUSING
745	P07460639	TAPERED KNOB M10-1.5 X 32
746	P07460746	CLUTCH HUB/LEVER
747	PSTB002M	STEEL BALL 8MM
748	P07460748	COMPRESSION SPRING
749	P07460749	LOCATOR PIN
750	P07460750	HEADED PIN 10 X 31
751	PSS03M	SET SCREW M6-1 X 8
752	P07460752	CLUTCH SHAFT
753	P07460753	SLIDE BLOCK
754	P07460754	CLUTCH
755	PRP58M	ROLL PIN 6 X 45
756	PCAP01M	CAP SCREW M6-1 X 16
757	P07460757	BEARING HOUSING
758	P6005-2RS	BALL BEARING 6005-2RS
759	PR25M	INT RETAINING RING 47MM
760	PK149M	KEY 8 X 8 X 25
761	PK186M	KEY 8 X 8 X 80
762	P07460762	LEADSCREW INPUT SHAFT
763	P07460763	PAD
764	P07460764	PAD RETAINER
765	P07460765	SPACER
766	P07460766	GEAR 30T
767	P07460767	SPACER
768	P07460768	GEAR 40T
769	P07460769	SPACER
770	P07460770	GEAR 60T
771	P6007-OPEN	BALL BEARING 6007-OPEN
772	P07460772	SLEEVE
773	PR19M	EXT RETAINING RING 28MM





# End Gears



## REF PART # DESCRIPTION

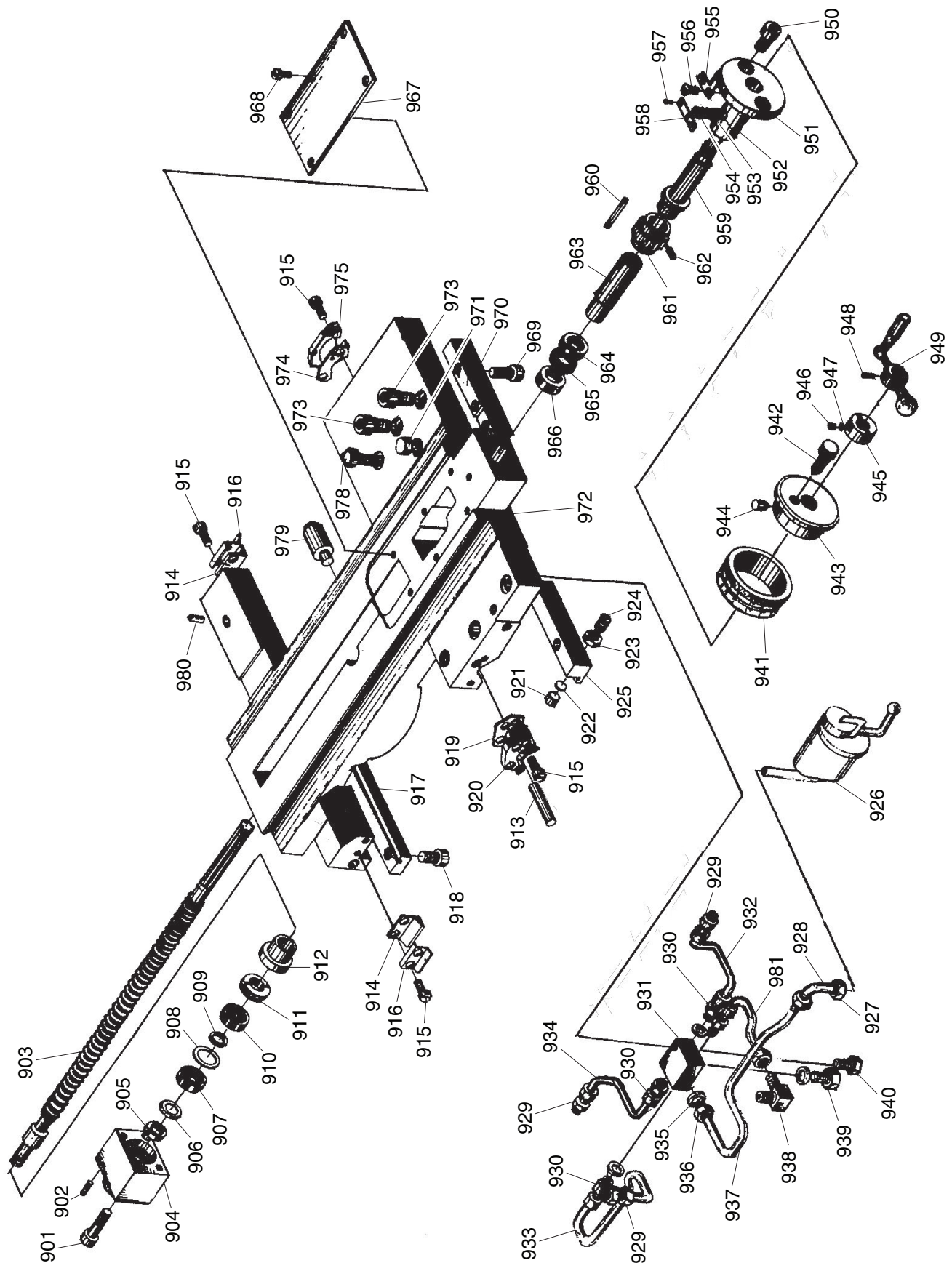
801	PCAP38M	CAP SCREW M5-.8 X 25
802	P07460802	DOWEL PIN 6 X 25
803	P07460803	GEAR END CAP
804	P07460804	COMBO GEAR 36T/38T
805	PR11M	EXT RETAINING RING 25MM
806	P07460806	SPACER
807	P6005ZZ	BALL BEARING 6005ZZ
808	P07460808	BEARING HOUSING
809	P07460809	COMBO GEAR 72T/76T
810	PCAP24M	CAP SCREW M5-.8 X 16
811	P07460811	SHAFT
812	P07460812	COMBO GEAR W/KEY 66T/42T 12 X 22

## REF PART # DESCRIPTION

813	P07460813	COMBO GEAR W/KEY 56T/44T 12 X 22
814	PN51M	HEX NUT M20-2.5 THIN
815	PW13M	FLAT WASHER 20MM
816	PW08M	FLAT WASHER 16MM
817	PN13M	HEX NUT M16-2
818	P07460818	CLAMP BOLT M20-2.5 X 40
819	P07460819	PIVOT BRACKET
820	PSS30M	SET SCREW M10-1.5 X 10
821	P07460821	COMPRESSION SPRING 1 X 6 X 12
822	PSTB002M	STEEL BALL 8MM
823	PR15M	EXT RETAINING RING 30MM



# Saddle



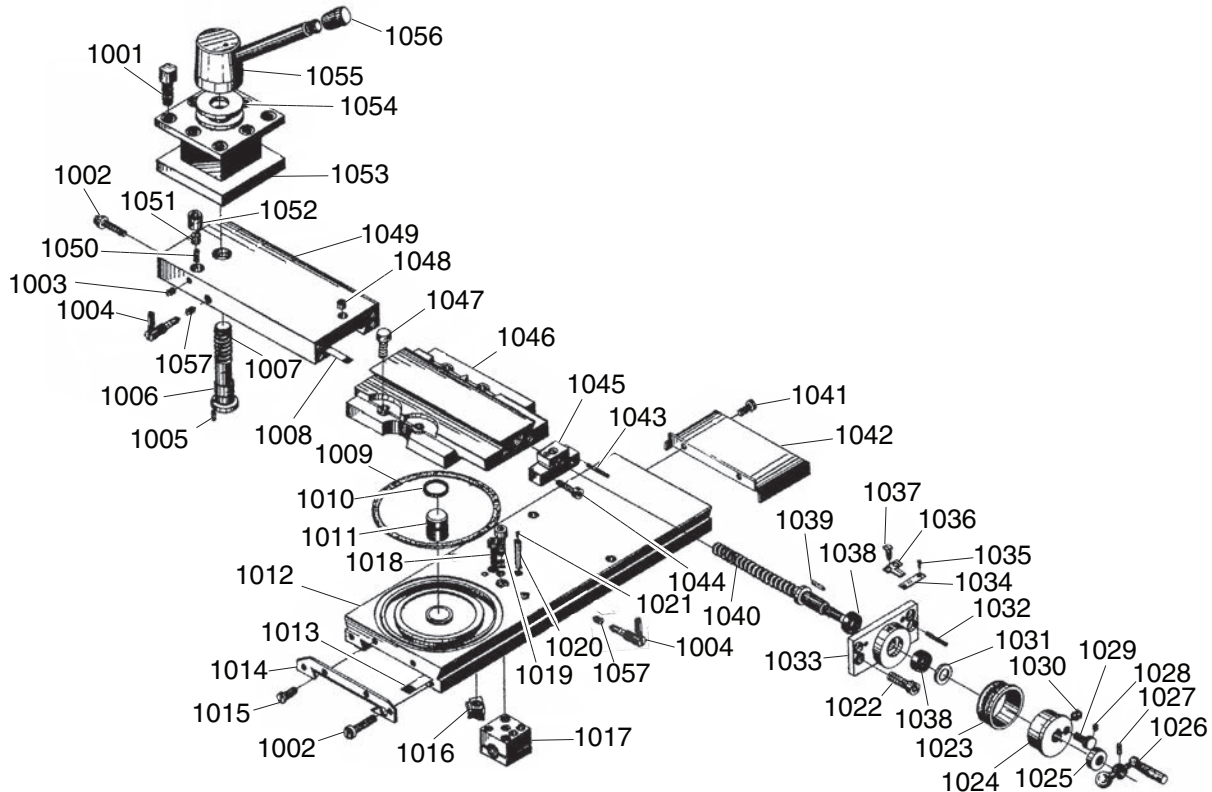
# Saddle Parts List

REF	PART #	DESCRIPTION
901	PCAP60M	CAP SCREW M8-1.25 X 55
902	P07460902	DOWEL PIN 6 X 30
903	P07460903	CROSS LEADSCREW
904	P07460904	CROSS LEADSCREW REAR BRACKET
905	P07460905	SPANNER NUT M14-1.5
906	P07460906	TABBED LOCK WASHER 14MM
907	P6202ZZ	BALL BEARING 6202ZZ
908	P07460908	SPACER
909	P07460909	SPACER
910	P6202ZZ	BALL BEARING 6202ZZ
911	P07460911	SPANNER NUT M14-1.5
912	P07460912	FLANGED BUSHING
913	P07460913	STOP PIN
914	P07460914	STRAIGHT WAY WIPER
915	PS09M	PHLP HD SCR M5-.8 X 10
916	P07460916	STRAIGHT WAY WIPER PLATE
917	P07460917	REAR BED CLAMP
918	PCAP61M	CAP SCREW M10-1.5 X 20
919	P07460919	V-WAY WIPER
920	P07460920	V-WAY WIPER PLATE
921	P07460921	PLUG
922	P07460922	PAD
923	PN03M	HEX NUT M8-1.25
924	PSS06M	SET SCREW M8-1.25 X 16
925	P07460925	LEFT FRONT BED CLAMP
926	P07460926	ONE-SHOT OIL PUMP ASSEMBLY
927	P07460927	OIL TUBE MALE COUPLING
928	P07460928	OIL TUBE
929	P07460929	OIL TUBE MALE COUPLING
930	P07460930	OIL TUBE MALE COUPLING
931	P07460931	OIL DISTRIBUTION UNIT
932	P07460932	OIL TUBE
933	P07460933	OIL TUBE
934	P07460934	OIL TUBE
935	P07460935	OIL SEAL
936	P07460936	OIL TUBE MALE COUPLING
937	P07460937	OIL TUBE
938	P07460938	OIL TUBE ELBOW COUPLING
939	P07460939	OIL PLUG W/SEAL
940	PB29M	HEX BOLT M6-1 X 30

REF	PART #	DESCRIPTION
941	P07460941	CROSS GRADUATED DIAL
942	P07460942	KNURLED THUMB SCREW M8-1.25 X 18
943	P07460943	DIAL BASE
944	P07460944	DIAL LOCKING PIN
945	P07460945	LOCK COLLAR
946	PSS31M	SET SCREW M5-.8 X 8
947	P07460947	PLUNGER
948	P07460948	TAPERED PIN 4 X 25
949	P07460949	CROSS BALL HANDLE
950	PCAP61M	CAP SCREW M10-1.5 X 20
951	P07460951	FLANGE
952	P07460952	SLEEVE
953	P07460953	COMPRESSION SPRING
954	PCAP52M	CAP SCREW M8-1.25 X 10
955	P07460955	INDICATOR PLATE
956	PS17M	PHLP HD SCR M4-.7 X 6
957	PRIV009M	STEEL FLUTED RIVET 2 X 6MM
958	P07460958	GRADUATED DIAL INFO PLATE
959	P07460959	SHAFT
960	P07460960	KEY 8 X 5 X 45
961	P07460961	GEAR 17T
962	PSS130M	SET SCREW M6-1 X 8 CONE-PT
963	P07460963	SHAFT
964	P07460964	BUSHING
965	P07460965	OIL SEAL 22 X 32 X 7
966	P07460966	BUSHING
967	P07460967	SADDLE TOP COVER
968	PS05M	PHLP HD SCR M5-.8 X 8
969	PCAP84M	CAP SCREW M10-1.5 X 35
970	P07460970	RIGHT FRONT BED CLAMP
971	P07460971	OIL FILL PLUG 1/4" NPT
972	P07460972	SADDLE
973	PCAP92M	CAP SCREW M12-1.75 X 40
974	P07460974	SQUARE WAY WIPER
975	P07460975	SQUARE WAY WIPER PLATE
978	P07460978	SQUARE HEAD BOLT M12-1.75 X 50
979	P07460979	STOP PIN
980	PLUBE002M	BALL OILER 8MM TAP-IN
981	P07460981	OIL TUBE



# Slides



## REF PART # DESCRIPTION

1001	P07461001	TOOL POST BOLT M16-2 X 50
1002	P07461002	GIB ADJUSTMENT SCREW
1003	P07461003	SET SCREW M5-.8 X 10 DOG-PT
1004	P07461004	LEAF SCREW M8-1.25 X 20
1005	PRP52M	ROLL PIN 6 X 16
1006	P07461006	BUSHING
1007	P07461007	TOOL POST BASE BOLT M24-3 X 170
1008	P07461008	COMPOUND REST GIB
1009	P07461009	COMPOUND REST ANGLE SCALE
1010	P07461010	INT ROUND-WIRE SNAP RING 30MM
1011	P07461011	PIVOT SHAFT
1012	P07461012	CROSS SLIDE
1013	P07461013	CROSS SLIDE GIB
1014	P07461014	WAY WIPER
1015	PS68M	PHLP HD SCR M6-1 X 10
1016	P07461016	T-NUT M12-1.75
1017	P07461017	CROSS LEADSCREW NUT
1018	PCAP72M	CAP SCREW M10-1.5 X 30
1019	PCAP35M	CAP SCREW M8-1.25 X 60
1020	P07461020	INT THREADED TAPERED PIN 8 X 50
1021	PSS31M	SET SCREW M5-.8 X 8
1022	PCAP31M	CAP SCREW M8-1.25 X 25
1023	P07461023	COMPOUND GRADUATED DIAL
1024	P07461024	DIAL BASE
1025	P07461025	LOCK COLLAR
1026	P07461026	COMPOUND REST BALL HANDLE
1027	P07461027	TAPERED PIN 3 X 20
1028	PSS26M	SET SCREW M5-.8 X 6
1029	P07460942	KNURLED THUMB SCREW M8-1.25 X 18

## REF PART # DESCRIPTION

1030	P07460944	DIAL LOCKING PIN
1031	P07461031	GASKET
1032	PRP73M	ROLL PIN 4 X 30
1033	P07461033	COMPOUND LEADSCREW BRACKET
1034	P07461034	DIAL INDICATOR PLATE
1035	PRIV009M	RIVET 2 X 6 STEEL FLUTED
1036	P07461036	INDICATOR PLATE
1037	PS17M	PHLP HD SCR M4-.7 X 6
1038	P51102	THRUST BEARING 51102
1039	PK23M	KEY 5 X 5 X 25
1040	P07461040	COMPOUND REST LEADSCREW
1041	PS09M	PHLP HD SCR M5-.8 X 10
1042	P07461042	CROSS SLIDE REAR COVER
1043	PRP28M	ROLL PIN 5 X 40
1044	PCAP40M	CAP SCREW M8-1.25 X 35
1045	P07461045	COMPOUND LEADSCREW NUT
1046	P07461046	COMPOUND REST BASE
1047	PB25M	HEX BOLT M12-1.75 X 25
1048	PLUBE002M	BALL OILER 8MM TAP-IN
1049	P07461049	COMPOUND REST
1050	P07461050	COMPRESSION SPRING
1051	P07461051	TOOL POST INDEXING PLUNGER
1052	P07461052	PLUNGER SLEEVE
1053	P07461053	TOOL POST BODY
1054	P07461054	TOOL POST FLAT WASHER 24MM
1055	P07461055	TOOL POST HUB/HANDLE
1056	P07460055	TAPERED KNOB M12-1.75 X 40
1057	P07459055	BRASS PLUNGER









# Apron Parts List

REF	PART #	DESCRIPTION
1101	PSS139M	SET SCREW M6-1 X 10 CONE-PT
1102	PRP29M	ROLL PIN 5 X 45
1103	PSS13M	SET SCREW M10-1.5 X 12
1104	P07461104	COMPRESSION SPRING
1105	P07461105	PLUNGER
1106	P07461106	TAPERED KNOB M10-1.5 X 18
1107	P07461107	FEED SELECTOR HUB/LEVER
1108	PCAP26M	CAP SCREW M6-1 X 12
1109	P07461109	FLANGE
1110	P07461110	LOCK COLLAR
1111	P07461111	SHAFT
1112	PR06M	EXT RETAINING RING 16MM
1113	P07461113	PIVOT ARM
1114	P07461114	SHIFT FORK
1115	P07461115	HEADED DOWEL PIN
1116	P07461116	GEAR HOUSING
1117	P07461117	FLANGED SLEEVE
1118	P07461118	COMPRESSION SPRING
1119	P07461119	GEAR 27T
1120	P07461120	SPACER
1121	P07461121	BELLEVILLE SPRING
1122	P07461122	INSERT RING
1123	P16002-OPEN	BALL BEARING 16002-OPEN
1124	P51102	THRUST BEARING 51102
1125	P07461125	HUB BASE
1126	PRP59M	ROLL PIN 5 X 12
1127	PCAP13M	CAP SCREW M8-1.25 X 30
1128	P07461128	FEED ROD CLUTCH HUB/LEVER
1129	PRP59M	ROLL PIN 5 X 12
1130	P07461130	HUB SHAFT
1131	PCAP02M	CAP SCREW M6-1 X 20
1132	P07461132	GEAR 18T
1133	P07461133	SHAFT
1134	PSS04M	SET SCREW M6-1 X 12
1135	P07461135	COMBO GEAR 18T/60T
1136	PRP114M	ROLL PIN 6 X 70
1137	P07461137	HALF NUT HUB/LEVER
1138	P07461138	DOWEL PIN 4 X 32
1139	P07461139	O-RING 2.62 X 75.87
1140	P07461140	SLEEVE
1141	P07460617	OIL SIGHT GLASS M27-1.5
1142	P07461142	BUSHING
1143	PSS130M	SET SCREW M6-1 X 8 CONE-PT
1144	P07461144	DIAL INFO PLATE
1145	P07461145	INDICATOR PLATE
1146	PRIV009M	STEEL FLUTED RIVET 2 X 6MM
1147	PCAP27M	CAP SCREW M6-1 X 14
1148	P07461148	LOCKING PIN
1149	P07460942	KNURLED THUMB SCREW M8-1.25 X 18
1150	PSS131M	SET SCREW M6-1 X 12 CONE-PT
1151	P07461151	HANDWHEEL RETAINER
1152	PFH88M	FLAT HD SCR M8-1.25 X 20
1153	P07461153	HANDWHEEL HANDLE M10-1.5 X 20

REF	PART #	DESCRIPTION
1154	P07461154	CARRIAGE HANDWHEEL
1155	P07461155	DIAL HUB
1156	PSS132M	SET SCREW M5-.8 X 8 CONE-PT
1157	P07461157	CARRIAGE GRADUATED DIAL
1158	P07461158	DIAL BASE
1159	P07461159	BUSHING
1160	P07461160	O-RING 3 X 13
1161	P07460604	KEY 8 X 5 X 25
1162	P07461162	SHAFT
1163	P07460604	KEY 8 X 5 X 25
1164	P07461164	GEAR 13T
1165	P07461165	BUSHING
1166	PRIV009M	RIVET 2 X 6MM STEEL FLUTED
1167	P07461167	APRON FRONT COVER
1168	P07460632	OIL DRAIN PLUG 1/4" NPT
1169	P07461169	OIL SEAL
1170	PSS140M	SET SCREW M6-1 X 12 DOG-PT
1171	P07461171	APRON HOUSING
1172	PSS130M	SET SCREW M6-1 X 8 CONE-PT
1173	P07461173	GEAR 59T
1174	P07461174	BUSHING
1175	P07461175	SPACER
1176	P07461176	GEAR SHAFT 13T
1177	P07460604	KEY 8 X 5 X 25
1178	PRP18M	ROLL PIN 4 X 12
1179	PSS128M	SET SCREW M10-1.5 X 25 DOG-PT
1180	PN03M	HEX NUT M8-1.25
1181	P07461181	DOWEL PIN 6 X 70
1182	P07461182	PLUNGER
1183	P07460802	DOWEL PIN 6 X 25
1184	P07461184	DOWEL PIN
1185	P07461185	HALF NUT LEFT GIB
1186	P07461186	HALF NUT 2-PC
1187	PCAP11M	CAP SCREW M8-1.25 X 16
1188	PW02M	FLAT WASHER 5MM
1189	PS05M	PHLP HD SCR M5-.8 X 8
1190	P07461190	HALF NUT SHIELD
1191	PTLW03M	INT TOOTH WASHER 8MM
1192	P07461192	DOWEL PIN 6 X 12
1193	P07461193	HALF NUT RIGHT GIB
1194	P07461194	HALF NUT COVER BACKING BOARD
1195	PR09M	EXT RETAINING RING 20MM
1196	P07461196	WORM GEAR
1197	PK149M	KEY 8 X 8 X 25
1198	P07461198	OIL SEAL 34 X 46 X 8
1199	PSS133M	SET SCREW M10-1.5 X 16 DOG-PT
1200	PRP113M	ROLL PIN 3 X 5
1201	P07461201	WORM SHAFT RACE
1202	PRP44M	ROLL PIN 3 X 10
1203	P07461203	SLIDING KEY
1204	P07461204	LOCK COLLAR
1205	P07461205	WORM SHAFT
1206	PK151M	KEY 8 X 8 X 55



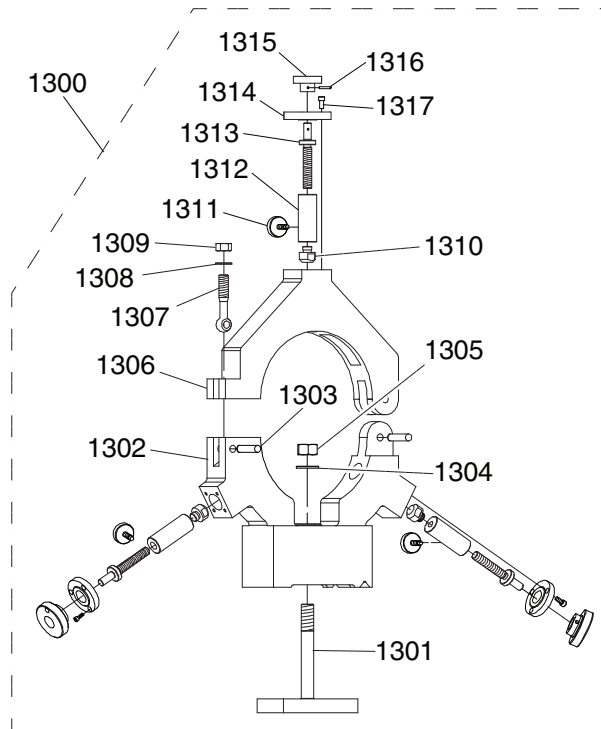
# Apron Parts List

REF	PART #	DESCRIPTION
1207	P07461207	SHAFT
1208	PCAP26M	CAP SCREW M6-1 X 12
1209	P07461209	BEARING FLANGE
1210	P51104	THRUST BEARING 51104
1211	P07461211	WORM SHAFT SUPPORT
1212	PCAP01M	CAP SCREW M6-1 X 16
1213	PCAP208M	CAP SCREW M8-1.25 X 95

REF	PART #	DESCRIPTION
1214	P07461214	STUD-DE M8-1.25 X 150, 20
1215	P07461215	BUSHING
1216	P07461216	THREAD DIAL BODY
1217	P07461217	THREAD DIAL SHAFT
1218	P07461218	THREAD DIAL GEAR 16T
1219	PRP73M	ROLL PIN 4 X 30
1220	PN03M	HEX NUT M8-1.25

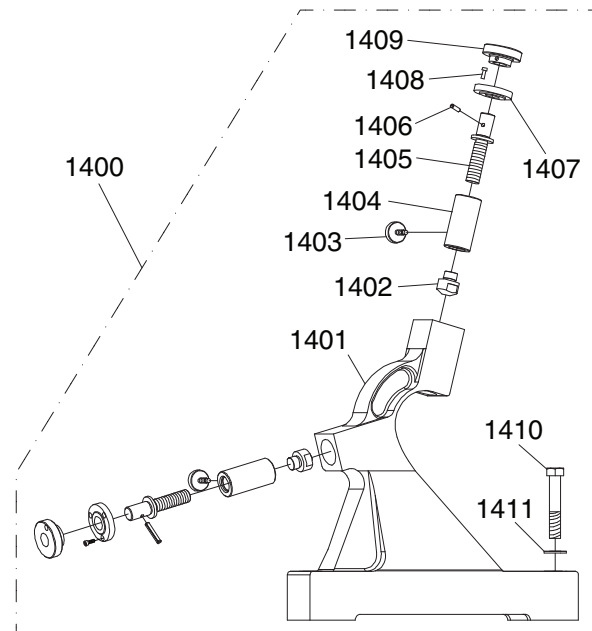


# Steady Rest



REF	PART #	DESCRIPTION
1300	P07461300	STEADY REST ASSEMBLY
1301	P07461301	BEDWAY CLAMP
1302	P07461302	LOWER STEADY REST CASTING
1303	P07461303	DOWEL PIN 6 X 55
1304	PW25MM	FLAT WASHER 24MM
1305	PN44M	HEX NUT M24-3
1306	P07461306	UPPER STEADY REST CASTING
1307	P07461307	EYE BOLT M16-2 X 75
1308	PW08M	FLAT WASHER 16MM
1309	PN13M	HEX NUT M16-2
1310	P07461310	BRASS FINGER
1311	P07461311	THUMB SCREW M8-1.25 X 25
1312	P07461312	THREADED SLEEVE
1313	P07461313	SHOULDER STUD M12-1.75 X 90 125L
1314	P07461314	SHOULDER STUD RETAINER CAP
1315	P07461315	THUMB KNOB
1316	PRP56M	ROLL PIN 4 X 25
1317	PCAP26M	CAP SCREW M6-1 X 12

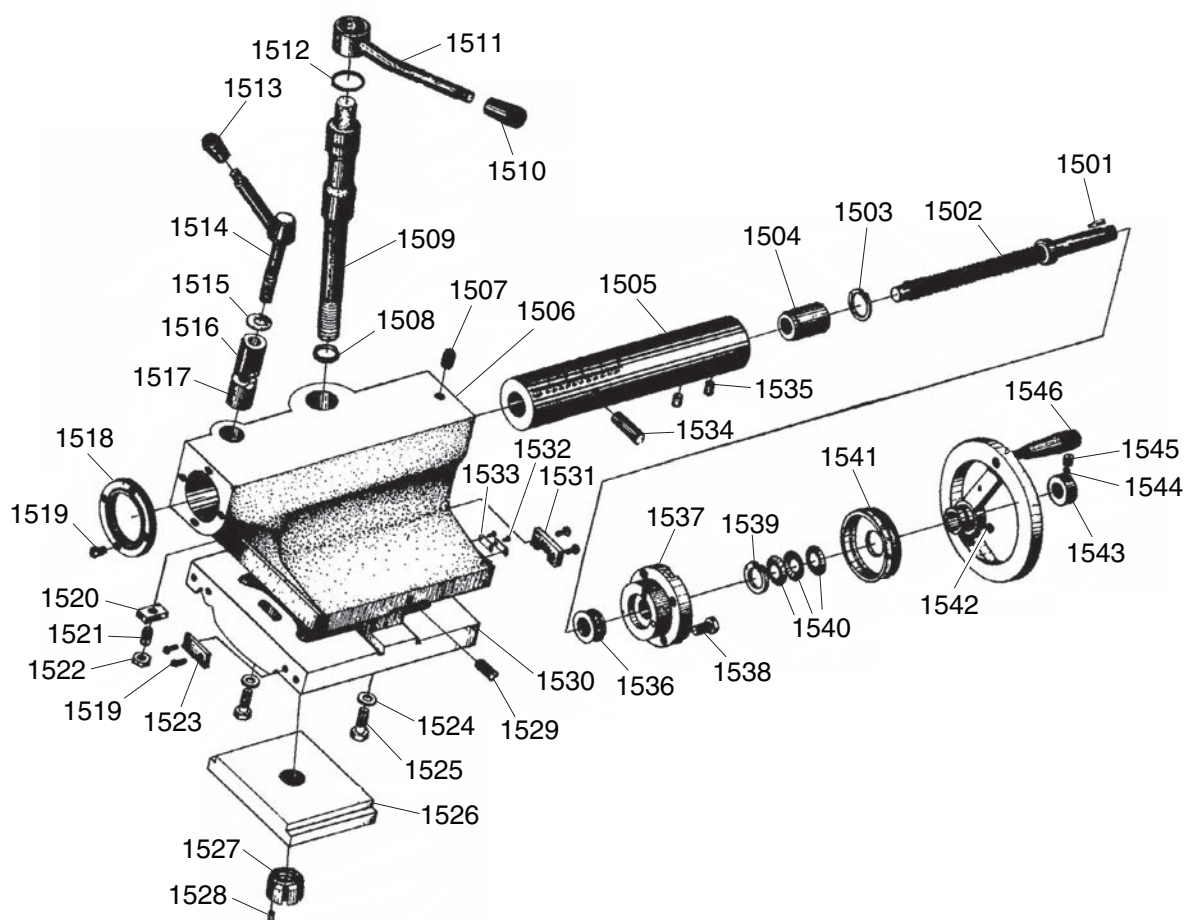
# Follow Rest



REF	PART #	DESCRIPTION
1400	P07461400	FOLLOW REST ASSEMBLY
1401	P07461401	FOLLOW REST CASTING
1402	P07461310	BRASS FINGER
1403	P07461311	THUMB SCREW M8-1.25 X 25
1404	P07461312	THREADED SLEEVE
1405	P07461313	SHOULDER STUD M12-1.75 X 90 125L
1406	PRP45M	ROLL PIN 5 X 32
1407	P07461314	SHOULDER STUD RETAINER CAP
1408	PCAP23M	CAP SCREW M4-.7 X 12
1409	P07461315	THUMB KNOB
1410	PB165M	HEX BOLT M16-2 X 60
1411	PW08M	FLAT WASHER 16MM



# Tailstock

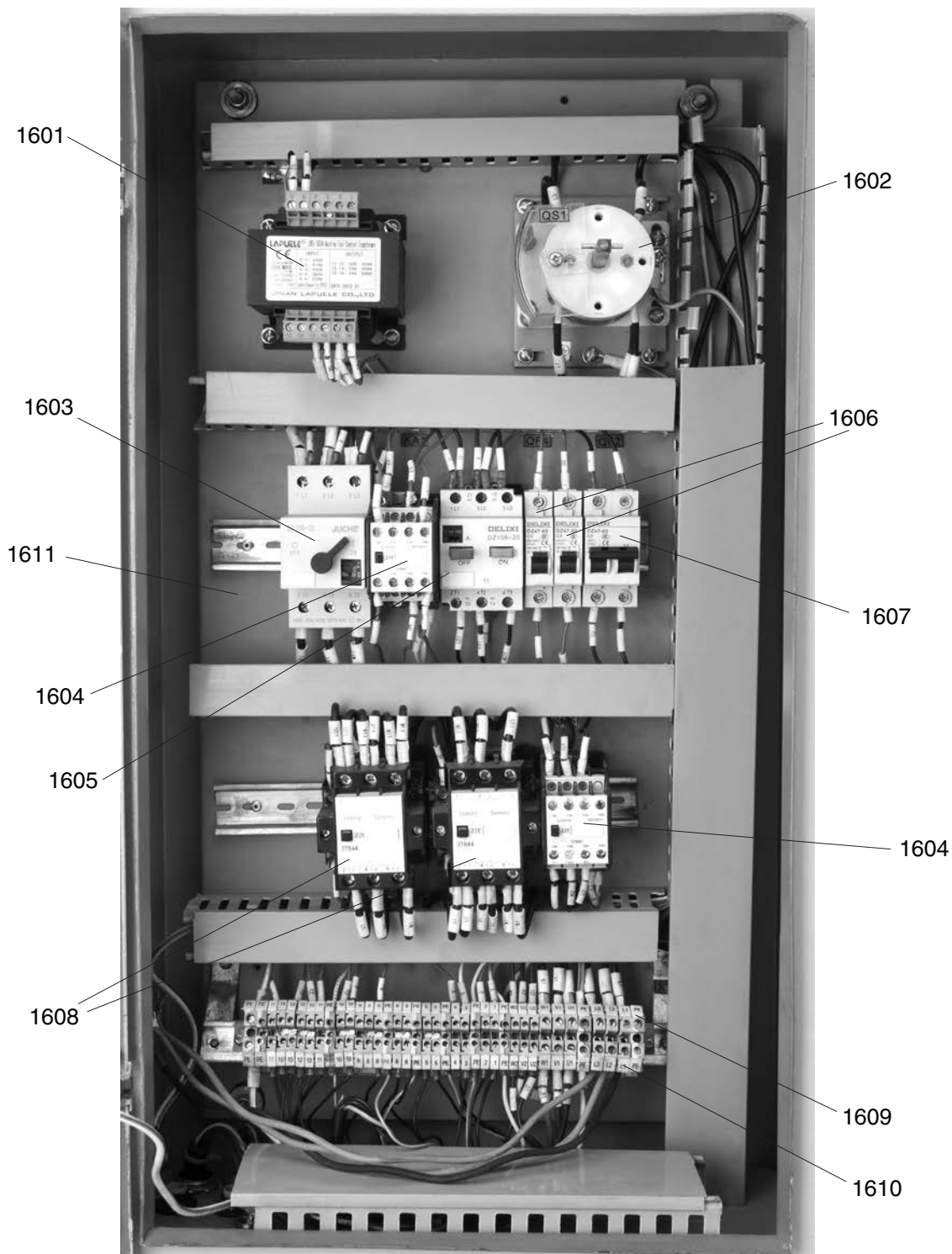


REF	PART #	DESCRIPTION
1501	P07460604	KEY 8 X 5 X 25
1502	P07461502	TAILSTOCK LEADSCREW
1503	PR21M	INT RETAINING RING 35MM
1504	P07461504	TAILSTOCK LEADSCREW NUT
1505	P07461505	QUILL
1506	P07461506	TAILSTOCK BODY
1507	PLUBE002M	BALL OILER 8MM TAP-IN
1508	PW25MM	FLAT WASHER 24MM
1509	P07461509	TAILSTOCK LOCK SHAFT
1510	P07461510	TAPERED KNOB M12-1.75 X 18
1511	P07461511	TAILSTOCK LOCK HUB/LEVER
1512	PORG030	O-RING 3.1 X 29.4 G30
1513	P07461106	TAPERED KNOB M10-1.5 X 18
1514	P07461514	QUILL LOCK HUB/LEVER
1515	PW06M	FLAT WASHER 12MM
1516	P07461516	UPPER QUILL CLAMP SLEEVE
1517	P07461517	LOWER QUILL CLAMP SLEEVE
1518	P07461518	QUILL WIPER
1519	PS09M	PHLP HD SCR M5-.8 X 10
1520	P07461520	THREADED KEY M8-1.25
1521	PSS09M	SET SCREW M8-1.25 X 20
1522	PN03M	HEX NUT M8-1.25
1523	P07461523	STRAIGHT WAY WIPER

REF	PART #	DESCRIPTION
1524	PW04M	FLAT WASHER 10MM
1525	PB01M	HEX BOLT M10-1.5 X 30
1526	P07461526	CLAMP PLATE
1527	P07461527	SLOTTED LOCK NUT M24-3
1528	PRP03M	ROLL PIN 5 X 20
1529	PSS141M	SET SCREW M12-1.75 X 35 CONE-PT
1530	P07461530	TAILSTOCK BASE
1531	P07461531	V-WAY WIPER
1532	P07461532	RIVET 2 X 6MM STEEL FLUTED
1533	PRIV009M	OFFSET SCALE 2-PC
1534	P07461534	DOWEL PIN
1535	PRP41M	ROLL PIN 6 X 12
1536	P51024	THRUST BEARING 51024
1537	P07461537	BEARING FLANGE
1538	PCAP52M	CAP SCREW M8-1.25 X 10
1539	PR15M	EXT RETAINING RING 30MM
1540	P07461540	BELLEVILLE LOCK WASHER 46.5 X 30.5 X 0.6
1541	P07461541	TAILSTOCK GRADUATED RING
1542	PSS03M	SET SCREW M6-1 X 8
1543	P07461543	LOCK COLLAR
1544	P07461544	PLUNGER
1545	PSS16M	SET SCREW M8-1.25 X 10
1546	P07461546	QUILL HANDWHEEL W/HANDLE



# Electrical Cabinet



## REF PART # DESCRIPTION

1601	P07461601	TRANSFORMER LAPUELE LBK5-160VA 220-440V
1602	P07461602	MASTER POWER SWITCH CHANGJIANG HZ12-40/07
1603	P07461603	CIRCUIT BREAKER JUCHE DZ108-32 22-32A
1604	P07461604	CONTACTOR SIEMENS 3TB4017-0A 24V
1605	P07461605	CIRCUIT BREAKER DELIXI DZ108-20
1606	P07461606	CIRCUIT BREAKER DELIXI DZ47-63 230-400V 1P

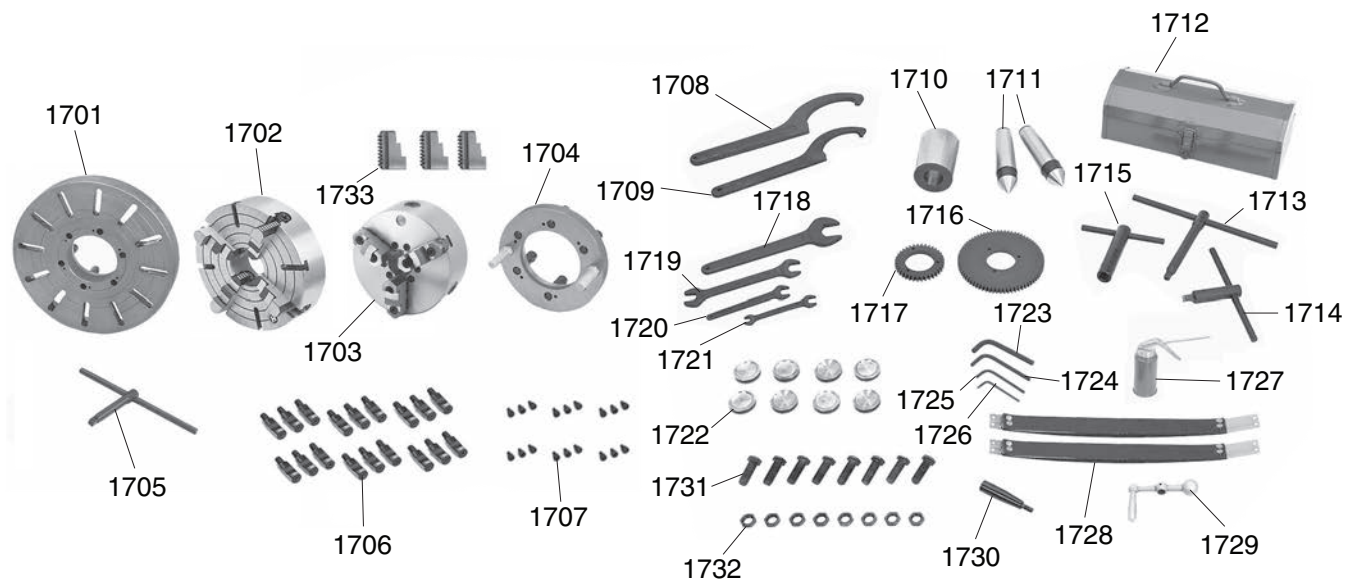
## REF PART # DESCRIPTION

1607	P07461607	CIRCUIT BREAKER DELIXI DZ47-63 400V 2P
1608	P07461608	CONTACTOR SIEMENS 3TB4417-0A 24V
1609	P07461609	TERMINAL BLOCK 1P YEL/GRN
1610	P07461610	TERMINAL BLOCK 1P GRAY
1611	P07461611	COMPONENT MOUNTING PLATE





# Accessories



## REF PART # DESCRIPTION

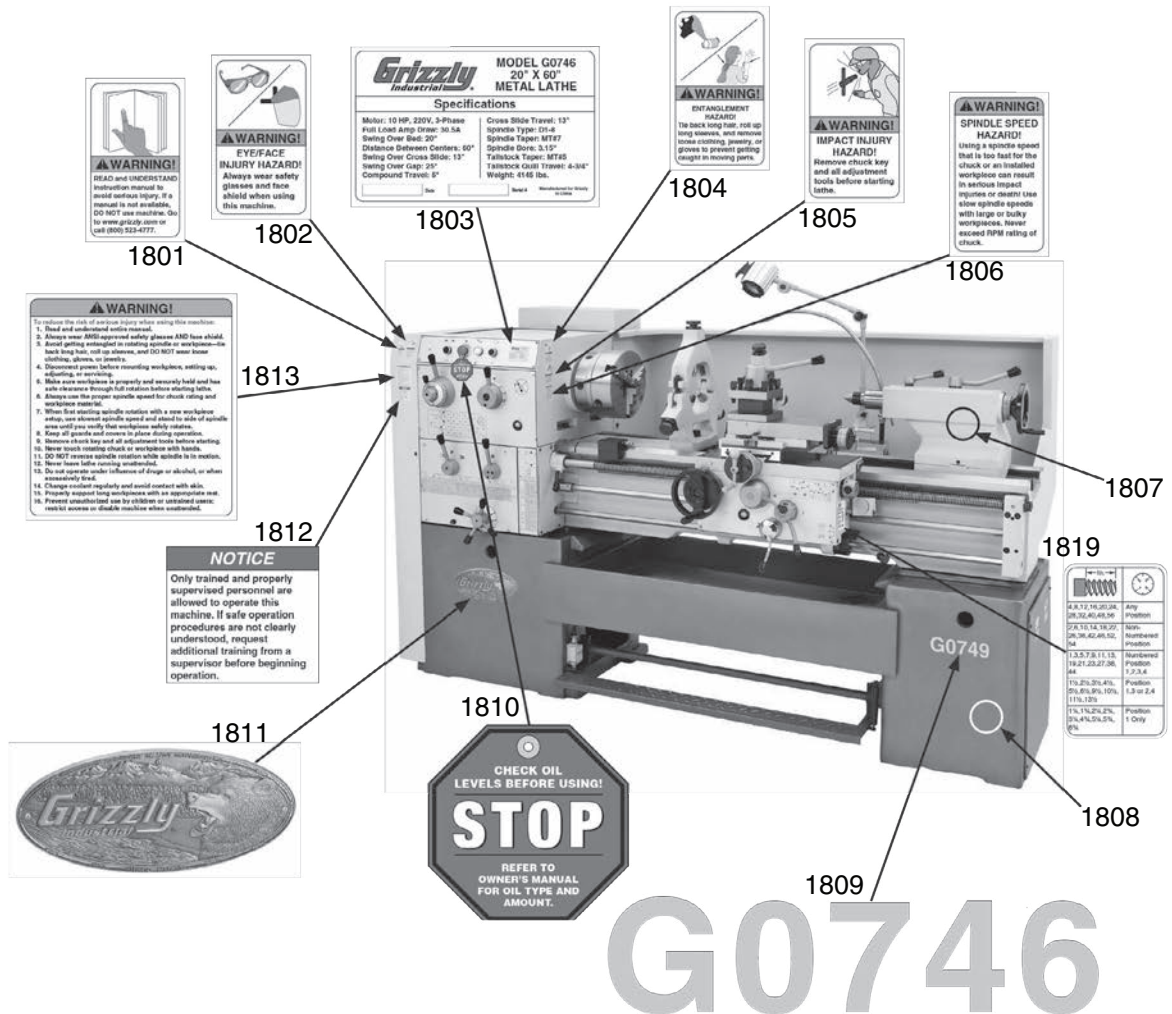
1701	P07461701	FACEPLATE 17"
1702	P07461702	4-JAW CHUCK 12"
1703	P07461703	3-JAW CHUCK 10" W/INSIDE JAW SET
1704	P07461704	DRIVE PLATE 9-3/8"
1705	P07461705	4-JAW CHUCK WRENCH
1706	P07461706	CAMLOCK STUD
1707	PCAP27M	CAP SCREW M6-1 X 14
1708	P07461708	SPANNER WRENCH 135-165MM
1709	P07461709	SPANNER WRENCH 110-130MM
1710	P07461710	TAPERED SPINDLE SLEEVE MT#7-MT#5
1711	P07461711	DEAD CENTER MT#5
1712	P07461712	TOOLBOX
1713	P07461713	SPINDLE WRENCH
1714	P07461714	3-JAW CHUCK WRENCH
1715	P07461715	TOOL POST T-WRENCH
1716	P07461716	CHANGE GEAR 72T
1717	P07461717	CHANGE GEAR 36T

## REF PART # DESCRIPTION

1718	PWR16	WRENCH 16MM OPEN-END
1719	PWR1924	WRENCH 19 X 24MM OPEN-ENDS
1720	PWR17	WRENCH 17MM OPEN-END
1721	PWR1013	WRENCH 10 X 13MM OPEN-ENDS
1722	P07461722	LEVELING PADS
1723	PAW10M	HEX WRENCH 10MM
1724	PAW08M	HEX WRENCH 8MM
1725	PAW06M	HEX WRENCH 6MM
1726	PAW05M	HEX WRENCH 5MM
1727	P07461727	OIL GUN
1728	P07461728	BRAKE BELT ASSEMBLY
1729	P07461729	CROSS SLIDE BALL HANDLE
1730	P07461730	CARRIAGE HANDWHEEL HANDLE
1731	P07461731	LEVELING BOLTS M16-2 X 45
1732	PN13M	HEX NUT M16-2
1733	P07461733	3-JAW CHUCK OUTSIDE JAW SET



# Front Machine Labels



REF	PART #	DESCRIPTION
1801	PLABEL-12A	READ MANUAL LABEL
1802	PLABEL-83B	EYE/FACE WARNING LABEL
1803	P07461803	MACHINE ID LABEL (G0746)
1803	P07491803	MACHINE ID LABEL (G0749)
1804	PLABEL-55	ENTANGLEMENT WARNING LABEL
1805	PLABEL-83	IMPACT INJURY WARNING LABEL
1806	PLABEL-84	SPINDLE SPEED HAZARD LABEL
1807	PPAINT-11	GRIZZLY PUTTY TOUCH-UP PAINT

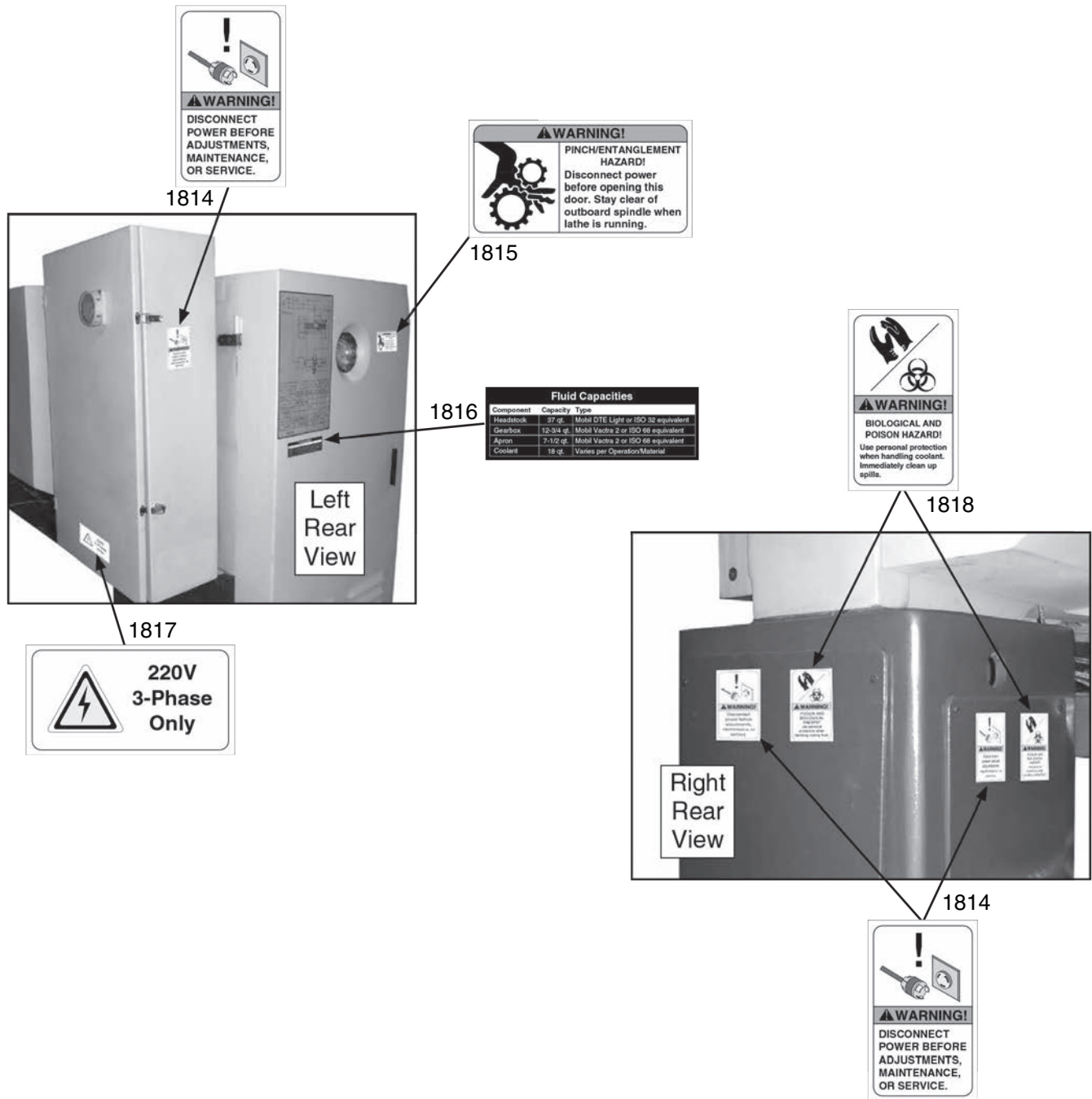
REF	PART #	DESCRIPTION
1808	PPAINT-1	GRIZZLY GREEN TOUCH-UP PAINT
1809	P07461809	MODEL NUMBER LABEL (G0746)
1809	P07491809	MODEL NUMBER LABEL (G0749)
1810	PLABEL-67	STOP FILL OIL TAG
1811	G8589	LARGE GRIZZLY OVAL NAMEPLATE
1812	PLABEL-85	TRAINED PERSONNEL NOTICE LABEL
1813	P07461813	GENERAL WARNINGS LABEL
1819	P07461819	THREAD DIAL CHART LABEL

## ! WARNING

Safety labels help reduce the risk of serious injury caused by machine hazards. If any label comes off or becomes unreadable, the owner of this machine **MUST** replace it in the original location before resuming operations. For replacements, contact (800) 523-4777 or [www.grizzly.com](http://www.grizzly.com).



# Rear Machine Labels

















REF	PART #	DESCRIPTION
1814	PLABEL-63	DISCONNECT WARNING LABEL
1815	P07461815	PINCH/ENTANGLEMENT WARNING LABEL
1816	P07461816	FLUID CAPACITIES LABEL

REF	PART #	DESCRIPTION
1817	PLABEL-87	220V 3-PHASE ELECTRICITY LABEL
1818	PLABEL-50	BIO HAZARD WARNING LABEL



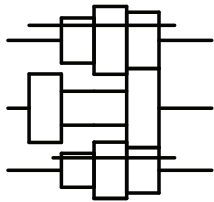




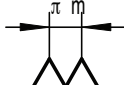

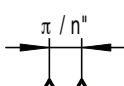
# SECTION 10: APPENDIX

## Threading and Feeding Chart

	 1/n"												 mm												 inch												
	F	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11			
	EG	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11			
		32	36	38	40	42	44	46	48	52	54	56	0.5	0.562	0.593	0.625	0.656	0.687	0.718	0.75	0.812	0.843	0.875	0.0027	0.003	0.0032	0.0034	0.0035	0.0037	0.0038	0.004	0.0043	0.0045	0.0047			
		16	18	19	20	21	22	23	24	26	27	28	1	1.125	1.187	1.25	1.312	1.375	1.437	1.5	1.625	1.687	1.75	0.0054	0.006	0.0064	0.0067	0.007	0.0073	0.0077	0.008	0.0087	0.009	0.0093			
		8	9	9½	10	10½	11	11½	12	13	13½	14	2	2.25	2.375	2.5	2.625	2.75	2.875	3	3.25	3.375	3.5	0.0107	0.012	0.0127	0.0135	0.014	0.0147	0.0153	0.016	0.0174	0.018	0.0187			
	4	4½	4¾	5	5¼	5½	5¾	6	6½	6¾	7	4	4.5	4.75	5	5.25	5.55	5.75	6	6.5	6.75	7	0.021	0.024	0.0235	0.027	0.028	0.029	0.031	0.032	0.035	0.036	0.0374				
		2	2¼	2⅓	2½	2⅝	2¾	3	3¼	3½	3¾	3½	8	9	9.5	10	10.5	11	11.5	12	13	13.5	14	0.043	0.048	0.051	0.054	0.056	0.059	0.061	0.064	0.069	0.072		0.075		
		1	1½	1⅓	1½	1⅝	1¾	1⅞	2	2¼	2½	2⅝	2¾	16	18	19	20	21	22	23	24	26	27	28	0.085	0.096	0.102	0.108	0.117	0.118	0.125	0.128	0.139		0.145	0.150	
		1	1½	1⅓	1½	1⅝	1¾	1⅞	2	2¼	2½	2⅝	2¾	16	18	19	20	21	22	23	24	26	27	28	0.085	0.096	0.102	0.108	0.117	0.118	0.125	0.128	0.139		0.145	0.150	



# Diametral & Modular Pitch Chart

<div> <math>Z_1</math>  <math>Z_2</math> </div>				
<div> <div>F</div> <div>G</div> <div>E</div> </div>				
 	1	0.5	1	2
	2	0.562	1.125	2.25
	3	0.593	1.187	2.374
	4	0.625	1.25	2.5
	5	0.656	1.312	2.624
	6	0.686	1.375	2.75
	7	0.718	1.437	2.874
	8	0.75	1.5	3
	9	0.812	1.625	3.25
	10	0.843	1.687	3.374
	11	0.875	1.75	3.5
 	1	32	16	8
	2	36	18	9
	3	38	19	9.5
	4	40	20	10
	5	42	21	10.5
	6	44	22	11
	7	46	23	11.5
	8	48	24	12
	9	52	26	13
	10	54	27	13.5
	11	56	28	14







# WARRANTY CARD

Name \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone # \_\_\_\_\_ Email \_\_\_\_\_  
Model # \_\_\_\_\_ Order # \_\_\_\_\_ Serial # \_\_\_\_\_

The following information is given on a voluntary basis. It will be used for marketing purposes to help us develop better products and services. **Of course, all information is strictly confidential.**

1. How did you learn about us?

\_\_\_\_\_ Advertisement      \_\_\_\_\_ Friend      \_\_\_\_\_ Catalog  
\_\_\_\_\_ Card Deck      \_\_\_\_\_ Website      \_\_\_\_\_ Other:

2. Which of the following magazines do you subscribe to?

_____ Cabinetmaker & FDM	_____ Popular Science	_____ Wooden Boat
_____ Family Handyman	_____ Popular Woodworking	_____ Woodshop News
_____ Hand Loader	_____ Precision Shooter	_____ Woodsmith
_____ Handy	_____ Projects in Metal	_____ Woodwork
_____ Home Shop Machinist	_____ RC Modeler	_____ Woodworker West
_____ Journal of Light Cont.	_____ Rifle	_____ Woodworker's Journal
_____ Live Steam	_____ Shop Notes	_____ Other:
_____ Model Airplane News	_____ Shotgun News	
_____ Old House Journal	_____ Today's Homeowner	
_____ Popular Mechanics	_____ Wood	

3. What is your annual household income?

\_\_\_\_\_ \$20,000-\$29,000      \_\_\_\_\_ \$30,000-\$39,000      \_\_\_\_\_ \$40,000-\$49,000  
\_\_\_\_\_ \$50,000-\$59,000      \_\_\_\_\_ \$60,000-\$69,000      \_\_\_\_\_ \$70,000+

4. What is your age group?

\_\_\_\_\_ 20-29      \_\_\_\_\_ 30-39      \_\_\_\_\_ 40-49  
\_\_\_\_\_ 50-59      \_\_\_\_\_ 60-69      \_\_\_\_\_ 70+

5. How long have you been a woodworker/metalworker?

\_\_\_\_\_ 0-2 Years      \_\_\_\_\_ 2-8 Years      \_\_\_\_\_ 8-20 Years      \_\_\_\_\_ 20+ Years

6. How many of your machines or tools are Grizzly?

\_\_\_\_\_ 0-2      \_\_\_\_\_ 3-5      \_\_\_\_\_ 6-9      \_\_\_\_\_ 10+

7. Do you think your machine represents a good value?

\_\_\_\_\_ Yes      \_\_\_\_\_ No

8. Would you recommend Grizzly Industrial to a friend?

\_\_\_\_\_ Yes      \_\_\_\_\_ No

9. Would you allow us to use your name as a reference for Grizzly customers in your area?

**Note:** We never use names more than 3 times.

\_\_\_\_\_ Yes      \_\_\_\_\_ No

10. Comments: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

FOLD ALONG DOTTED LINE

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Place  
Stamp  
Here



**GRIZZLY INDUSTRIAL, INC.**  
**P.O. BOX 2069**  
**BELLINGHAM, WA 98227-2069**



FOLD ALONG DOTTED LINE

Send a Grizzly Catalog to a friend:

Name_____
Street_____
City_____State_____Zip_____

TAPE ALONG EDGES--PLEASE DO NOT STAPLE

# WARRANTY & RETURNS

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Grizzly Industrial, Inc. warrants every product it sells for a period of **1 year** to the original purchaser from the date of purchase. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence, accidents, repairs or alterations or lack of maintenance. This is Grizzly's sole written warranty and any and all warranties that may be implied by law, including any merchantability or fitness, for any particular purpose, are hereby limited to the duration of this written warranty. We do not warrant or represent that the merchandise complies with the provisions of any law or acts unless the manufacturer so warrants. In no event shall Grizzly's liability under this warranty exceed the purchase price paid for the product and any legal actions brought against Grizzly shall be tried in the State of Washington, County of Whatcom.

We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special, or consequential damages arising from the use of our products.

To take advantage of this warranty, contact us by mail or phone and give us all the details. We will then issue you a "Return Number," which must be clearly posted on the outside as well as the inside of the carton. We will not accept any item back without this number. Proof of purchase must accompany the merchandise.

The manufacturers reserve the right to change specifications at any time because they constantly strive to achieve better quality equipment. We make every effort to ensure that our products meet high quality and durability standards and we hope you never need to use this warranty.

Please feel free to write or call us if you have any questions about the machine or the manual.

Thank you again for your business and continued support. We hope to serve you again soon.



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